

# *Department of Transportation's*

## INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PROJECTS BOOK

Compiled by:

U.S. Department of Transportation  
Intelligent Transportation Systems (ITS) Joint Program Office

Federal Highway Administration  
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Office of Safety and Traffic Operations R&D  
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Federal Transit Administration  
Office of Mobility Innovation

National Highway Traffic Safety Administration  
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\* Location after title identifies project as operational test.

# **I. INTRODUCTION**

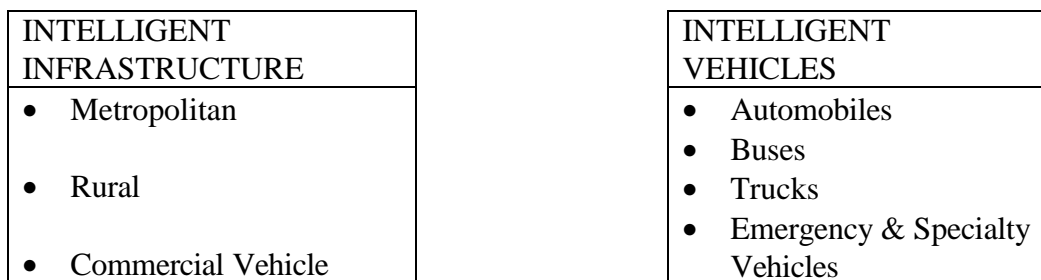
# I. INTRODUCTION

Intelligent Transportation Systems (ITS), formerly Intelligent Vehicle-Highway Systems (IVHS), provide the technology applications helping the nation address current surface transportation problems and while concurrently providing approaches for dealing with future demands through a strategic, intermodal view of transportation. ITS applies proven and emerging technologies in fields such as data processing, communications, control, navigation and electronics to surface transportation challenges. While ITS technologies alone cannot satisfy the nation's growing transportation needs, they provide the means to revise current approaches to problem solving and improve the efficiency and cost-effectiveness of existing systems. When deployed and effectively integrated, ITS technologies provide very meaningful benefits including more efficient use of the nation's infrastructure and of energy resources, complemented by measurable improvements in safety, mobility, productivity and accessibility.

To foster national deployment and integration of ITS technologies, the U.S. Department of Transportation (U.S. DOT) initiated a multi-faceted ITS program involving research and field operational testing of promising ITS technology applications. The previous edition of this document addressed program direction during what was in many respects a transition year bridging the end of the era launched by the enactment of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) signed into law in July 1998. The previous ITS Projects Book introduced the emerging realignment of the program into infrastructure categories and the integration of vehicle technology activities into an Intelligent Vehicle Initiative (IVI). This edition reflects the restructuring of the program and the realignment of both legacy projects and new projects (i.e., those initiated in FY1998) into the new categories.

The realignment of the program from eight technical areas into the new structure reflects U.S. DOT's goals for facilitating deployment of intelligent infrastructure in the three areas: metropolitan, rural, and commercial vehicle. Concurrently, the program will facilitate the research, testing, and evaluation of intelligent vehicle technology. Figure 1 depicts the current program structure.

Figure 1



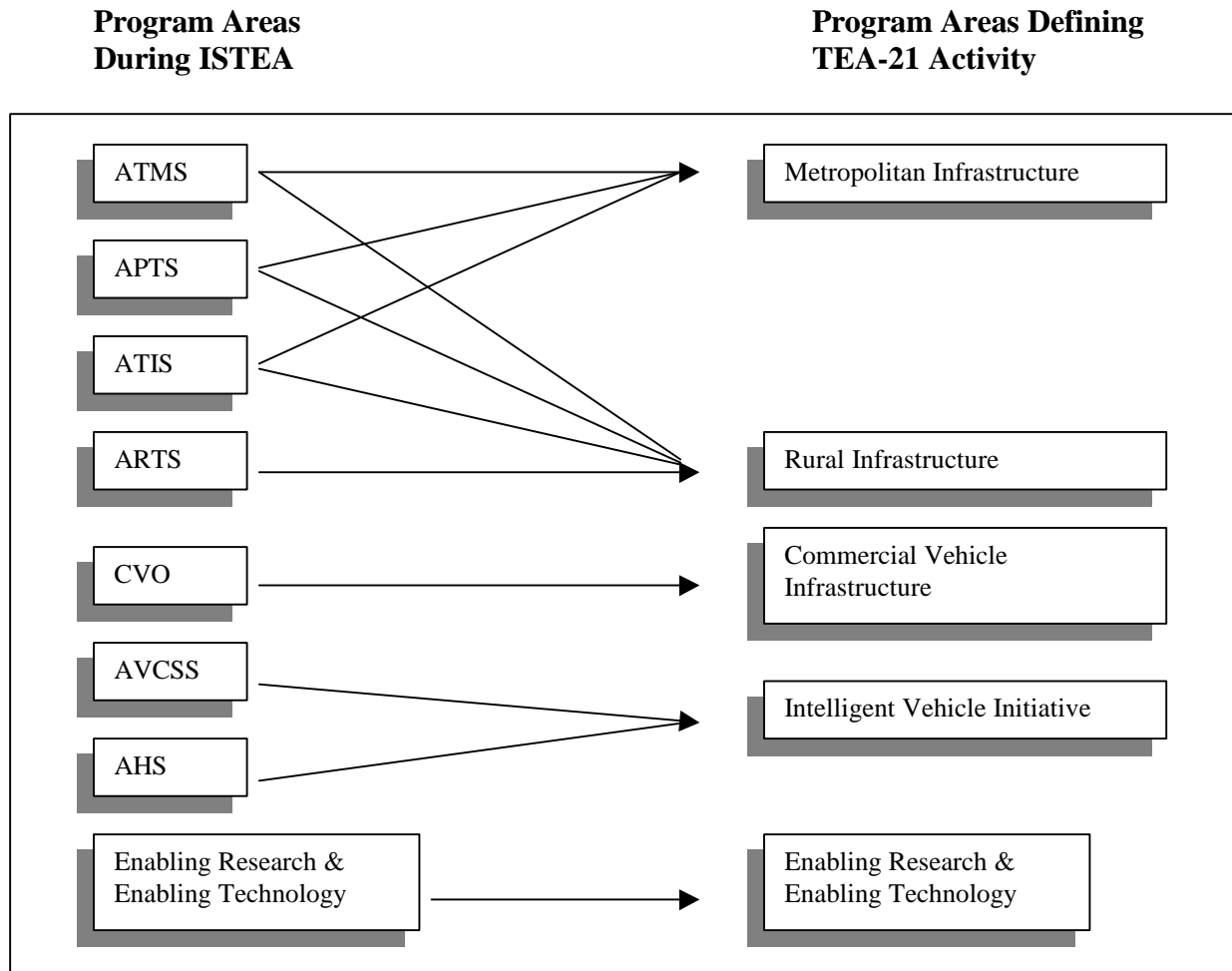
The program reorientation reflects the evolution of emphasis on deployment whose outputs are infrastructure and/or vehicles. Metropolitan ITS Infrastructure inherits the research in Advanced

Traffic Management Systems, Advanced Public Transportation Systems and Advanced Traveler Information Systems. The Rural ITS Infrastructure encompasses the activities of Advanced Rural Transportation Systems program that includes the application of technologies under development for Metropolitan and Commercial Vehicle Infrastructure that are adaptable to rural community needs. The Commercial Vehicle ITS infrastructure continues to build on the research endeavors of the Commercial Vehicle Operations Program. The Intelligent Vehicle Initiative integrates the work accomplished in various facets of intelligent vehicle research and development to include the Advanced Vehicle Control and Safety Systems Program.

The Enabling Research and Technology program area continues to provide crosscutting support to each of the four functional components comprising the program's foundation. Figure 2 provides a crosswalk depicting the dynamics of the realignment.

Figure 2

ITS Program Reorientation



## Program Area Acronyms

ATMS	Advanced Traffic Management Systems
APTS	Advanced Public Transportation Systems
ATIS	Advanced Traveler Information Systems
ARTS	Advanced Rural Transportation Systems
CVO	Commercial Vehicle Operations
AVCSS	Advanced Vehicle Control and Safety Systems
AHS	Automated Highway Systems

Within the framework of this structure, the ITS Program is focused on activities impacting both near term and long term horizons.

**Near Term.** Through the end of FY2003, the effective period of TEA-21, the program will focus on facilitating integrated deployment of ITS components in the defined infrastructure categories.

- **Metropolitan ITS Infrastructure** will integrate various components of advanced traffic management, traveler information, and public transportation systems to achieve improved efficiency and safety and providing enhanced information and travel options for the public.
- **Commercial Vehicle ITS Infrastructure** is oriented on integrating technology applications for improving commercial vehicle safety, enhancing efficiency and facilitating regulatory processes for the trucking industry and government agencies. The principal instrument of this component is known as **Commercial Vehicle Information Systems and Networks (CVISN)**, a system of information systems that link the nodes supporting communications among carriers and agencies.
- **Rural ITS Infrastructure** is characterized by a framework of seven ITS service “clusters” comprised of services such as weather information, rural transit and tourist information. ITS technologies are demonstrating exceptional effectiveness and customer acceptance in such applications that are tailored to rural transportation settings. The logical architecture for these clusters has not been developed, and some applications are still in varied stages of development.

The development of a robust market fueled by private sector investment is dependent on a critical mass of basic ITS infrastructure.

A critical challenge in achieving a seamless, intermodal transportation system is ensuring interoperability through the use of an open, non-proprietary architecture and ITS standards. The Department is employing the following initiatives to meet this challenge:

- Showcasing the benefits of integration in modal deployments;
- Facilitating the development of standards;
- Providing training;

- Offering guidance and technology transfer;
- Providing deployment guidance for projects receiving incentive funding;
- Providing assistance for achieving consistency with the National ITS Architecture and Standards.

**Long Term.** The long-term focus will be directed at supporting research, development and testing of advanced technologies demonstrating potential for deployment in the five-to-twenty-year horizon. The in-vehicle component of this effort will be consolidated into a single *Intelligent Vehicle Initiative* centered heavily on applying driver assistance and control intervention systems to reduce vehicle crashes. A companion effort seeks to integrate driving assistance and motorist information functions to facilitate information processing, decision making and more effective vehicle operation.

This document describes ITS projects, tests, and studies initiated through September 30, 1998 that have been partially or totally financed from Federal ITS funds. However, the Completed Projects sections, which are located at the end of each chapter, include projects that were actually finished as of September 30, 1998, plus those projects anticipated to be completed by the end of December 1998. The purpose of this report is not to account for all Federal funds made available for ITS activities, but rather to describe all major projects, tests, and studies for each ITS program area.

Throughout this report, U.S. DOT administrations are identified as follows: FHWA -- Federal Highway Administration (within FHWA, the Office of Motor Carriers [OMC] is the proponent for Commercial Vehicle Operations projects and the Turner-Fairbank Highway Research Center [TFHRC] is the focal point for research), FRA -- Federal Railroad Administration, FTA -- Federal Transit Administration, and NHTSA -- National Highway Traffic Safety Administration. These organizational elements are in effect through calendar 1998. Effective January 1, 1999 an FHWA reorganization will redesignate the Office of Motor Carriers as the Office of Motor Carriers and Highway Safety. Although these organizations may not be listed as partners in some of the projects, it is understood that at least one administration is involved in each partnership arrangement.



## **II. METROPOLITAN ITS INFRASTRUCTURE**

## **II. METROPOLITAN ITS INFRASTRUCTURE**

Metropolitan ITS Infrastructure is dedicated to integrating the various components of advanced traffic management, traveler information, and public transportation systems. The principal objective of this integration is to enable the operation and management of a metropolitan area's multimodal transportation systems as a coordinated whole to provide travelers with timely and reliable information about trip planning and en-route alternatives.

In 1996, then Secretary of Transportation Federico Pena established a goal of deploying ITS infrastructure in 75 of the nation's largest metropolitan areas within ten years. This goal was reaffirmed by Secretary Slater in 1997 and was subsequently expanded to include 76 metropolitan areas. In metropolitan areas, the components of the ITS infrastructure include traffic signal control, freeway and incident management, transit management, regional multimodal traveler information systems, electronic fare payment, electronic toll collection, railroad grade crossing, and emergency management services. These components, when integrated on a common communication structure, provide an intelligent transportation infrastructure facilitating information access across agency and organizational lines. This integration substantially enhances individual functions and creates a set of public and private services that form a foundation for the evolution of the long range vision of ITS.

A major initiative in support of metropolitan area deployment goals is the Metropolitan Model Deployment Initiative Program. Four sites were selected to become deployment showcases of fully integrated, Metropolitan Intelligent Transportation Infrastructure. These model deployments will demonstrate the benefits of integrated transportation management systems featuring effective regional, multimodal traveler information services.

The ITS technologies comprising metropolitan infrastructure advanced significantly during the period of ISTEA authorization. The emphasis of research and operational testing in this timeframe was heavily focused on the problem areas severely impacting metropolitan areas: safety, congestion, and mobility. In numerous cases, systems deployed in the operational test program have resulted in quantifiable benefits, and have been incorporated as permanent elements of their areas' transportation systems.

Deployment tracking results reveal that numerous regions throughout the Nation have deployed one or more of the elements of metropolitan infrastructure. The potential for maximizing benefits of intermodal management and delivery of additional services lies in successful technical integration and interjurisdictional coordination of these elements.

The projects described in the following sections have, and are, contributing to an enhanced capability to provide integrated user services. As noted in the introduction to this document, the ITS Program has been reoriented to reflect the transition to an emphasis on deployment. Projects retain their identities as research and development, operational tests and deployments (also identified as "other"), but they have been grouped by element in the classification structure

consisting of intelligent infrastructure and intelligent vehicles. In many cases, projects cut across more than one intelligent infrastructure element such as traffic signal control projects which include major traveler information aspects and/or linkages to transit properties. The categorization was made with full acknowledgment that some projects might have been categorized differently. The Integrated Programs, Metropolitan Model Deployment Initiatives, and Priority Corridors Program inherently encompass multiple infrastructure elements.

The Metropolitan ITS Infrastructure elements are summarized as follows:

- **Traffic Signal Control** systems automate the process of adjusting signals to optimize traffic flow.
- **Freeway Management Systems** provide information to motorists and detect problems to increase capacity and minimize congestion resulting from accidents.
- **Transit Management Systems** enable new ways of monitoring and maintaining transit fleets through advanced vehicle locating devices, equipment monitoring systems, and fleet management systems.
- **Incident Management Programs** enable authorities to identify and respond to vehicle crashes or breakdowns with the most appropriate and timely emergency services, thereby minimizing recovery times.
- **Electronic Toll Collection** provides drivers and transportation agencies with convenient and reliable automated transactions, to improve traffic flow at toll plazas and increase the operational efficiency of toll collection.
- **Electronic Fare Payment Programs** enable motorists to pay for parking, bus and train fares, as well as tolls, by using a single smart card.
- **Advanced Rail-Highway Crossings**, coordinate traffic signal operations and train movements, and notify drivers of approaching trains through in-vehicle warning systems.
- **Emergency Response** is coordinated to ensure the nearest and most appropriate emergency service units respond to a crash.
- **Regional Multimodal Traveler Information** systems provide road and transit information to travelers, businesses, and truckers to enhance the effectiveness of trip planning and en-route alternatives.

During the period of ISTEA, states and localities sought to expand the effectiveness of their traffic management capabilities. Interconnection of signals and computerized signal control evolved into fully integrated, dynamically adaptive regional strategies enabling metropolitan areas to exercise proactive management of freeway ramps and arterial roadways. With advanced sensors providing a more comprehensive overview of network performance, advanced analysis,

control options and advanced communications will enable multiple jurisdictions to manage their systems and coordinate various management actions more effectively. The ultimate goal in this area is to provide greatly expanded “real-time” control capabilities which adapt to traffic movement, anticipating when and where traffic will be moving, so that signal and freeway control systems will be able to provide optimum service. In an integrated environment, traffic information will be shared among jurisdictions as well as with transit properties, travelers, businesses, and commercial carriers.

Achieving this vision will require successful completion of several key research and development efforts, testing of sensor technologies, control systems, and the integration of these systems in addition to continued support for widespread deployment of Metropolitan ITS Infrastructure in metropolitan areas across the Nation.

Building on the legacy of ISTEA, the future direction for Metropolitan ITS Infrastructure points toward continued deployment and a special focus on integration. The success of Metropolitan ITS Infrastructure hinges, to a great extent, on integrating traffic management systems, advanced public transportation systems and advanced traveler information systems.

Many research and development projects and operational tests have brought advances in understanding the approaches to, and benefits of, integrating Metropolitan ITS Infrastructure. The culmination of this effort was the establishment of the Metropolitan Model Deployment Initiative program.

One of the unique advances fostered by the ITS Program is innovation in collecting and distributing expanded information for both “pre-trip” and “en-route” travelers. In many cases, these travel information systems are multimodal, including both roadway and transit system performance information. These sources of information enable travelers to make informed choices based on up-to-date relevant data. These capabilities can also support personal and public agency efforts to reduce demand and increase vehicle occupancy.

A key feature of many regional travel information projects is the participation of private sector companies interested in marketing traveler information. The creation of viable public-private partnerships in these projects is highly valuable, and the eventual success of such partnerships is a key goal of deployment.

The ITS Program for Public Transit encompasses a number of technologies aimed at increasing the use, operational efficiency and cost effectiveness of the services provided by public transit agencies. The scope of these operations nationwide includes approximately 6,000 agencies operating more than 100,000 vehicles. These operations support approximately 9 billion trips annually.

The Advanced Public Transportation Systems applications have been developed principally to support the needs addressed in three components of the Metropolitan ITS Infrastructure: Transit Management Systems, Regional Multimodal Traveler Information, and Electronic Fare Payment

Programs. The functional applications encompassed by these components are Fleet Management, Transit Traveler Information, and Electronic Fare Payment Programs.

Fleet Management Systems are primarily directed at improving the operations and productivity of transit agencies and the safety of their passengers. Transit Traveler Information utilizes several technologies for the dissemination of transit information that facilitates and encourages the use of public transportation. Electronic Fare Payment Programs embrace the technology aimed at the use of “smart cards” to pay for transit, parking and other potential uses which make transit more convenient for the traveler.

The operational tests described in the Metropolitan ITS Infrastructure section, with headers identifying them as Transit Management Systems-related, encompass the technologies addressed above. These operational tests are designed to evaluate varying technologies in terms of their effectiveness in improving transit operations and evaluating the consumer acceptance and benefits of a variety of techniques to encourage the use of transit.

In addition to operational tests, there have been a number of full-scale deployment projects employing ITS technologies. These have been concentrated in Fleet Management Systems derived from earlier operational test/deployment results and the Federal Transit Administration’s research and development program.

Several companies currently use transit fleet management technology applications based on receiving Global Positioning System signals to perform automatic vehicle location integrated with computer-aided dispatch system to provide real-time fleet management of buses and paratransit vehicles. In excess of 25 transit agencies either have, or are in the process of deploying such fleet management systems. The motivation for these initiatives is found in the significant benefits to be derived in improved passenger safety, reduced operating costs, and improved customer service resulting from enhanced schedule adherence. Some operational tests build on deployed automatic vehicle location systems to reap the benefits of integration with sources of traveler information, traffic management centers, and other components of metropolitan infrastructure.

Another important activity in many transit properties, including several operational tests, is to test new ways of giving the traveling public transit information. Transit operators are well aware that the traditional printed schedule is difficult to read and a disincentive to the use of public transit. A wide variety of techniques are being tested to determine how to communicate to the public and to increase the number of people using transit. These technologies span a broad range of approaches because one technique will not serve all segments of the riding public.

Transit is in the forefront in the use of the new technology called “Smart Cards.” These devices resemble credit cards, but feature a microprocessor imbedded in the card that is used as an electronic purse. A customer may add money to the card at various outlets, and as each purchase/use is registered, the value is deducted from the card. Variations on this application are being used in operational tests in a number of cities. Many of these applications have begun operation and are expected to produce significant benefits in passenger convenience, reduced fare handling costs, reduced fare evasion, and increased ridership.

Effective implementation of travel management improvements through use of ITS cannot be fully achieved by implementing stand-alone projects. Especially in metropolitan areas, an integrated program of linked, complementary projects covering areas such as traffic control, freeway and incident management, transit management, and traveler information is necessary to maximize benefits while minimizing costs. To date, several of these integrated programs have been supported with Federal ITS funds, as described in this chapter under “Integrated Programs.” These programs are more comprehensive in scope, size, and objectives than individual projects, yet they do not fall into the very specific categories of Priority Corridors or Model Deployment Initiatives identified below.

### **Priority Corridors Program**

The Intermodal Surface Transportation Efficiency Act of 1991 established criteria for the ITS (then IVHS) Priority Corridors; and U.S. DOT followed with designation of four corridors, which are:

- the I-95 Corridor (including Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia);
- the Midwest Corridor (Gary, Indiana, to Milwaukee, Wisconsin);
- Houston, Texas; and
- Southern California (Los Angeles to San Diego).

As described in the following sections, the organizations carrying forward the program within each of these four areas have developed business planning processes and have initiated extensive programs of projects. The programs in these four areas are building toward integrated transportation management and traveler information systems, and incorporate a wide range of ITS technologies and services. In addition, the institutional relationships that have been developed and strengthened through the initiation of the Priority Corridors Program has led to enhanced working relationships among traffic, transit, and other entities across jurisdictional boundaries.

### **Model Deployment Initiatives**

To support moving ahead with greatly expanded deployment of ITS using regular Federal-aid and other state/local funding, the U.S. DOT initiated the Model Deployment Initiative. The metropolitan area Model Deployment Initiatives are intended to support integrated transportation management systems, and feature a strong, regional, multimodal traveler information services component. These model deployment sites will demonstrate and showcase the measurable benefits resulting from the application of an integrated, region-wide approach to transportation management and the provision of traveler information services. The model deployment sites will provide improved transportation management and increased levels of service to the traveling public, businesses, and commercial carriers through the integration of the traditional functions of traffic signal control; transit, freeway, and incident management; emergency services management; regional, multimodal traveler information services; and electronic toll and fare payment. In

addition to introducing the public to the benefits of ITS products and services, the sites will serve as “showcases” for key local decision makers across the U.S., and will support peer-to-peer interaction and seminars focused on the benefits of ITS infrastructure investments by both the public and private sectors. The model deployment sites also will provide a setting for conducting rigorous evaluations of the benefits of an integrated metropolitan area ITS infrastructure.

# **METROPOLITAN ITS INFRASTRUCTURE**



# **Traffic Signal Control**

# ARIZONA CENTER FOR TRAFFIC AND LOGISTICS ALGORITHMS & SOFTWARE (ATLAS)

**Description:** This project will utilize a steering committee comprised of state, local and Federal participants who will develop a work plan for Metropolitan and Rural Intelligent Infrastructure research on traffic and logistics issues. The committee will oversee the management and conduct of the research so as to complement the FHWA intelligent infrastructure research program. There will be a focus on real-time traffic control software and on development of logistics software.

**Project Location :** Tucson, Arizona

**Contractor(s)** University of Arizona

**Start Date:** August 1998

**End Date:** August 2000

**Estimated Total ITS Funds:** \$1,000,000

**Estimated Total Project Cost:** \$1,200,000

**Contacts:**

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Alan Hansen	FHWA Arizona Division, HPR1-AZ	(602) 379-3646
Pitu Mirchandani	University of Arizona	(602) 621-6551



# INTEGRATED RAMP METERING/ADAPTIVE SIGNAL CONTROL

## **Description:**

This project will evaluate the operational effects of balancing traffic flow between I-5/I-405 and the parallel arterial streets. The project will also demonstrate the effectiveness of collaborative action on the part of transportation management agencies to optimize their strategies to improve traffic flow. The project will integrate an existing centrally-controlled freeway ramp meter system with an arterial signal system consisting of existing signal controllers, the new Advanced Traffic Controller, and an adaptive control algorithm (OPAC).

## **Project Location :**

Irvine (Orange County), California

## **Partner(s) :**

California DOT (CalTrans), City of Irvine, Farradyne Systems, and University of California - Irvine

## **Start Date:**

September 1993

## **End Date:**

June 1999

## **Estimated Total ITS Funds:**

\$2,617,000

## **Estimated Total Project Cost:**

\$3,271,250

## **Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
John Thai	City of Irvine, CA	(949) 724-7311



# NORTH SEATTLE ADVANCED TRAFFIC MANAGEMENT SYSTEM

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## **Description:**

This project will explore methods for adjacent traffic signal systems to share loop detector and operational data to improve operations across boundaries and between adjacent systems. Jurisdictional issues which often prevent coordinating adjacent systems will be addressed during this project. Data will be obtained from several systems in the I-5 corridor north of Seattle by a single microcomputer connected with street or central master controllers belonging to the various jurisdictions within the corridor. The microcomputer will compile the volume, occupancy and operations data and transmit it back to the participating control systems. Each system will then use the data to improve its traffic management capabilities.

**Project Location :** North Seattle, Washington

**Partner(s) :** Washington State DOT

**Start Date:** July 1993

**End Date:** March 2000

**Estimated Total  
ITS Funds:** \$3,500,000

**Estimated Total  
Project Cost:** \$4,375,000

## **Contacts:**

Mike Morrow	FHWA Washington Division, HPM-WA	(206) 753-9551
Dave Berg	Washington State DOT	(206) 440-4485



## BROOKLYN-BRONX-QUEENS SIGNALIZATION

### **Description:**

This project supports the development, installation and evaluation of new, advanced traffic controllers (ATC) for integration into the signal system for New York City's five boroughs. The project developed controller prototypes, field test hardware and software, and evaluated system performance before installing additional ATCs at various locations around the City. The development of the controller prototype specification will be completed under the Topics program using \$0.2M of city funds. After the specification is complete (March 1999), the city will develop a separate contract to furnish and install the new controllers at approximately 500-1000 intersections. ITS funds will be used for the installation contract.

### **Project Location :**

Brooklyn and Bronx, New York

### **Partner(s) :**

New York State DOT and New York City DOT

### **Start Date:**

July 1995

### **End Date:**

October 2001

### **Estimated Total ITS Funds:**

\$3,750,000

### **Estimated Total Project Cost:**

\$4,687,500

### **Contacts:**

Arthur O'Connor	FHWA/FTA NYC Metro Office	(212) 466-3856
Fred Lai	New York State DOT	(718) 482-4733



# NORTHERN VIRGINIA TRAFFIC SIGNAL MANAGEMENT SYSTEM

## **Description:**

This project implements a computerized traffic signal system in the Virginia DOT Northern Virginia District and initially includes about 800 signals in Fairfax, Prince William, and Loudoun Counties. The system is a computer-based, networked, central system operating on a multi-tasking environment. Communication to the signals is by leased digital telephone lines. The system provides information management, reporting and analysis of data, inventory control, maintenance logging, real-time graphics display, location designs, and cabinet wiring diagrams. The system has the ability to upload and download all timing settings, operations parameters, and status information from the central control room or remote access locations. Five remote access workstations is provided. The Real-Time Traffic Adaptive Control System is being field tested on a 16-signal corridor as part of the project.

**Project Location :** Fairfax County, Virginia

**Partner(s) :** Virginia DOT

**Start Date:** July 1993

**End Date:** February 1999

**Estimated Total  
ITS Funds:** \$5,250,000

**Estimated Total  
Project Cost:** \$24,000,000

## **Contacts:**

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
Ken Wester	Virginia DOT - Richmond	(703) 383-2457



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## SYRACUSE CONGESTION MANAGEMENT SYSTEM

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**Description:** This project supports the implementation and evaluation of a central computerized signal system in the city of Syracuse.

**Project Location :** Syracuse, New York

**Partner(s) :** New York State DOT

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**Start Date:** June 1996

**End Date:** June 1999

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**Estimated Total  
ITS Funds:** \$3,000,000

**Estimated Total  
Project Cost:** \$8,536,575

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### Contacts:

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Ed Roberts	New York State DOT	(518) 457-1232	



# **Freeway Management Systems**



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## BETA TESTING OF SOFTWARE

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**Description:**

This activity will allow practitioners to assess the integrity and applicability of newly modified or developed FHWA software. This will allow FHWA to better match user needs, thereby reducing the time needed to bring traffic engineering software to the market-ready stage.

**Project Location :** Gainesville, Florida

**Contractor(s) :** University of Florida

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**Start Date:** September 1994

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$521,221

**Estimated Total  
Project Cost:** \$551,650

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**Contacts:**

Henry Lieu

FHWA - TFHRC, HSR-10

(703) 285-2410

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# DATABASES FOR ASSESSMENT OF OPERATIONAL TESTS AND TRAFFIC MODELS

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**Description:**

This study involves defining data required for the validation and verification of traffic models. This study will also include the collection and storage of traffic data from different sites strategically selected around the country and the subsequent maintenance of the databases. Additionally, issues will be addressed including type of storage needed (central vs. distributed), hardware and software platforms, and user interfaces (pre - and post - processing activities). Some of this data will be obtained from existing data sources or on-going ITS field operational tests. Special emphasis will be placed on data collection from the Real-Time Traffic Adaptive Control System field testing. The verification and validation techniques and database management system will be applied to FHWA's TRAF family of models.

**Project Location :** Colorado Springs, Colorado

**Contractor(s) :** ITT Systems

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**Start Date:** June 1995

**End Date:** August 1999

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**Estimated Total ITS Funds:** \$1,630,896

**Estimated Total Project Cost:** \$1,630,896

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**Contacts:**

Gene McHale

FHWA - TFHRC, HSR-10

(703) 285-2973

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# HUMAN FACTORS IN ADVANCED TRAFFIC MANAGEMENT SYSTEMS (ATMS) DESIGN EVOLUTION

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**Description:**

The goal of this study is to investigate and define the human factors issues involved in a fully functional, state-of-the-art Advanced Traffic Management System (ATMS). Products of this effort include the development of a Human Factors Handbook for Traffic Management Center (TMC) Designers, a human-centered engineering analysis of an advanced traffic management center, a database of TMC human factors research and a stand-alone human factors research TMC simulator.

Products from the requirements analysis include second generation scenarios and systems objectives, definition of system functions, allocation of functions, operator performance requirements, task analysis and human factors design guidance. The Comparable Systems Analysis has been published by FHWA. The First Edition Human Factors Handbook of Traffic Management System Design has been published. The human factors studies in the experimental program have begun and are in various stages of completion.

**Project Location :**

Atlanta, Georgia

**Contractor(s) :**

Georgia Tech Research Institute - Georgia Institute of Technology

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**Start Date:**

September 1992

**End Date:**

May 1999

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**Estimated Total  
ITS Funds:**

\$5,464,297

**Estimated Total  
Project Cost:**

\$5,464,297

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**Contacts:**

Nazemeh Sobhi

FHWA - TFHRC, HSR-30

(703) 285-2907

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# HUMAN FACTORS COMPUTER - AIDED DESIGN TOOL FOR TRAFFIC MANAGEMENT CENTERS

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**Description:**

The effective design and modification of traffic management centers will benefit from easily accessed design tools and information which facilitate a human factored design. The Computer - Aided Design Support System (CADDs) tool developed in this project will include human factors guidelines for the design of traffic management centers, access to TMC research specific to operator issues and other tools which assist the designer in achieving optimal usability of TMC equipment. Efficient tool access will be achieved via rapid retrieval and tool centralization. CADDs will provide appropriate tools (e.g., design guidelines) and information at the appropriate design steps and phases without extensive searching through large volumes of data. Work nearing completion includes a requirements analysis for TMC designers.

**Project Location :** Atlanta, Georgia

**Contractor(s) :** Georgia Tech Research Corporation-Georgia Institute of Technology

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**Start Date:** September 1996

**End Date:** August 2000

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**Estimated Total ITS Funds:** \$1,988,000

**Estimated Total Project Cost:** \$1,998,000

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**Contacts:**

Nazemeh Sobhi

FHWA-TFHRC, HSR-30

(703) 285-2907

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# INTEGRATION OF TRAFFIC OPERATIONS AND TRAFFIC DATA COLLECTIONS

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**Description:** This research establishes a process and methodology for the integrated collection of traffic data. This research is expected to result in increased awareness of organizational objectives and increased cooperation between traffic engineering/operations staff and the traffic data collection efforts of the transportation planning programs at both the local and State levels. Georgia DOT and Washington State DOT have been scheduled to conduct this study. The completion of a final report is a work in progress, and delivery is expected in early 1999.

**Project Location :** Atlanta, Georgia

**Contractor(s) :** Georgia DOT and Washington State DOT

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**Start Date:** July 1993

**End Date:** February 1999

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**Estimated Total ITS Funds:** \$495,000

**Estimated Total Project Cost:** \$495,000

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## Contacts:

Bill Grush

FHWA Headquarters, HPM-30

(202) 366-5052

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# TRAFFIC SURVEILLANCE AND DETECTION TECHNOLOGY DEVELOPMENT

## **Description:**

This funding will be used to identify and develop new detection technologies and surveillance concepts. With the rapid advances in industry technology, new options for detection need to be made available for use by traffic management centers. As ITS-class Dynamic Traffic Assignment, Real-Time Traffic-Adaptive Control, and Incident Detection systems are developed, new measures of effectiveness (such as queue lengths) may be required inputs to these modules. This study will identify potential means of obtaining this data directly from the field using new surveillance and detection capabilities that are more accurate and cost-effective than those which are currently available. This project is conducted in two phases. The first phase being conducted is an effort to adapt various sensor technologies for use in transportation detection applications. The second phase is an effort to conduct testing to determine the relationships between the data the sensor can provide and the performance of ATMS functions alone and integrated. In order to identify performance relationships between function/sensor combinations, part of phase two will investigate the integration of data from these advance sensors with various ATMS functions.

**Project Location :** Pasadena, California

**Contractor(s) :** Jet Propulsion Laboratory (JPL)

**Start Date:** September 1994

**End Date:** September 1999

**Estimated Total  
ITS Funds:** \$7,240,000

**Estimated Total  
Project Cost:** \$7,240,000

## **Contacts:**

Deborah Curtis

FHWA - TFHRC, HSR-10

(703) 285-2542



# BARBOURSVILLE-ONA, WEST VIRGINIA TRAFFIC MANAGEMENT

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## **Description:**

This project consists of improving access to and from the Huntington Mall and other properties located along US Route 60 and Mail Road (Cabell Co. 60/89). The Huntington Mall Road is a heavily traveled road with a 1995 Average Daily Traffic of 23,600 vehicles weekdays and 40,000 vehicles per weekend. The Huntington Mall Road begins at US Route 60 as a three-lane roadway and proceeds north under the I-64 bridge where it becomes a five-lane roadway section with four lanes northbound and one lane southbound. Immediately north of the westbound entrance ramp and the westbound exit ramp intersections, the road consists of seven lanes with five lanes northbound and two lanes southbound.

## **Project Location :**

Barboursville-ONA, West Virginia

## **Partner(s) :**

West Virginia Department of Highways

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## **Start Date:**

October 1998

## **End Date:**

November 1999

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## **Estimated Total ITS Funds:**

\$8,000,000

## **Estimated Total Project Cost:**

\$11,210,842

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## **Contacts:**

Ed Compton	FHWA West Virginia Division, HA-WV	(304) 558-2066
Dave Bodnar	West Virginia Department of Highways	(304) 558-2885

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## BRONX/NORTHERN MANHATTAN ATMS

### Description:

This project has two parts:

Part 1: Transmit Expansion – This project will expand TRANSCOM's Transmit Program into Bronx County. Approximately 18 reader locations that will be capable of communicating with the E-Z Pass tags will be installed on various highways in the Bronx for traffic data collection purposes.

Part 2: Systems in the State/City Traffic Management Center (TMC) (2 projects) – This program will construct an interim and permanent traffic control center for New York State DOT in the Long Island Corridor. The first project will cost \$0.5M and is expected to be completed in early 1999. The second project (for the permanent center) will cost \$1.7M and is scheduled for construction in early 2000 with completion of construction in June 2002.

**Project Location :** New York, New York

**Partner(s) :** New York State DOT

**Start Date:** July 1995

**End Date:** June 2002

<b>Estimated Total ITS Funds:</b>	\$4,650,000	\$2.4M (Project 1)	2.2M (Project 2)
<b>Estimated Total Project Cost:</b>	\$5,812,500	\$3.0M	2.75M

### Contacts:

Arthur O'Connor	FHWA/FTA NYC Metro Office	(212) 466-3856
Fred Lai	NYSDOT	(718) 482-4733





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## CARAT

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**Description:** The Congestion Avoidance and Reduction for Automobiles and Trucks (CARAT) project is a long-range, comprehensive implementation of a congestion management project for freeways and connected arterials in the Charlotte urban area. The ITS project is focusing on the design/build/warrant (D/B/W) procurement process of the CARAT project.

**Project Location :** Charlotte, North Carolina

**Partner(s) :** North Carolina DOT, City of Charlotte, University of North Carolina System

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**Start Date:** June 1992

**End Date:** April 1999

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**Estimated Total  
ITS Funds:** \$10,990,000

**Estimated Total  
Project Cost:** \$15,237,500

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### Contacts:

Max Tate	FHWA North Carolina Division, HDA-NC	(919) 856-4354
Roberto Canales	North Carolina DOT	(919) 250-4159



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## FAIRBORN, OHIO ADVANCED TRAFFIC MANAGEMENT SYSTEM

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**Description:**

The purpose of this project is to improve mobility on public roadways in the vicinity of a university multipurpose arena during special events. The consultant will also evaluate the effectiveness of Advanced Traveler Information System (ATIS) technologies when integrated with traditional traffic engineering improvements.

**Project Location :**

Fairborn, Ohio

**Partner(s) :**

Ohio DOT, Miami Valley Regional Planning Commission (MVRPC), City of Fairborn, City of Beavercreek, and Wright State University.

**Start Date:**

May 1998

**End Date:**

February 2000

**Estimated Total  
ITS Funds:**

\$1,000,000

**Estimated Total  
Project Cost:**

\$1,000,000

**Contacts:**

James Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
George Saylor	Ohio DOT	(614) 752-8099
Anne Hassoun	MVRPC	(937) 233-6323



## I-90 CONNECTOR, RENSSELAER COUNTY, NEW YORK

### **Description:**

The FY 1998 Rensselaer County earmark of \$1.25M for Rensselaer County has been divided into two projects. The Rensselaer Polytechnic Institute (RPI) will receive \$500K to develop ITS training and the remaining funds (\$750K) will be used for ITS research to support the I-90 Connector/Test Bed. ITS Test Bed Research--This project will fund ITS research on a 3-mile, in-situ test bed facility on the Rensselaer County, I-90 Connector. The ITS research will include: investigation of communications technologies to link the test bed with the soon-to-be opened Northway Incident Management/Traffic Operations Center, traffic operation data collection, deployment of temporary ITS equipment in the study area, and the establishment of partnerships with educational institutions and/or private sector ITS firms. Rensselaer Polytechnic Institute in coordination with the FHWA Professional Capacity Building Program will use advance education technologies to design, develop and deploy educational modules on ITS topics in a variety of settings. The target audience for this new training is ITS professionals. Course topics to be addressed are wireless communications, the operations of a traffic management center, and video detection and surveillance technologies. All of the education modules will be designed to be delivered (1) in face-to-face classroom settings, (2) individual learning via either the Web or CD ROM and (3) using distance learning technologies such as video conferencing and interactive web work.

**Project Location :** Rensselaer County, New York

**Partner(s) :** New York State DOT

**Start Date:** October 1998

**End Date:** February 2001

**Estimated Total  
ITS Funds:** \$1,250,000

**Estimated Total  
Project Cost:** \$1,562,500

### **Contacts:**

Mike Schauer	FHWA New York Division, HDT-NY	(518) 431-4125	Ext. 236
Paul Cuerdon	New York State DOT	(518) 474-6377	



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## I-275, ST. PETERSBURG, FLORIDA

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**Description:**

This project will provide a variable message sign system on I-275. It includes two variable message signs and the central control system.

**Project Location :**

St. Petersburg, Florida

**Partner(s):**

Florida DOT

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**Start Date:**

October 1998

**End Date:**

TBD

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**Estimated Total  
ITS Funds:**

\$1,000,000

**Estimated Total  
Project Cost:**

\$1,000,000

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**Contacts:**

Grant Zammit	FHWA Florida Division – HDA-FL	(850) 962-9693
Bijan Behzadi	Florida DOT	(850) 975-6733

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## I-287 SURVEILLANCE SYSTEM

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**Description:** This project will deploy CCTV as well as the necessary hardware, software, and communication systems.

**Project Location :** New York

**Partner(s) :** New York State Thruway Authority (NYSTA)

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**Start Date:** February 1993

**End Date:** June 1999

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$1,500,000

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### Contacts:

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125
Barry Solomon	NYSTA	(518) 471-4352

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## LOUISIANA INTERSTATE 55, 10 AND 610, INTELLIGENT TRANSPORTATION SYSTEMS

**Description:** The focus of this project will be the deployment of ITS elements in the New Orleans Metropolitan area. Emphasis will be placed on traveler information systems, video surveillance and interagency communication subsystems. This project will also include the design and construction of a Traffic Management Center.

**Project Location :** New Orleans, Louisiana

**Partner(s) :** Louisiana State DOT, New Orleans Regional Planning Commission

**Start Date:** October 1998

**End Date:** June 2001

**Estimated Total  
ITS Funds:** \$5,500,000

**Estimated Total  
Project Cost:** \$6,875,000

### Contacts:

Seve Serna	FHWA Louisiana Division, HDA-LA	(504) 389-0251
Steve Strength	Louisiana DOT District Office	(504) 437-3260
Conrad Rein	New Orleans Regional Planning Commission	(504) 568-6643
Peter Allain	Louisiana DOT Headquarters	(225) 935-0262



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## LOWER HUDSON VALLEY

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**Description:**

This project will provide for the creation of a Traffic Operations Center which will be jointly staffed by the New York State Department of Transportation, the New York State Thruway Authority, and the County of Westchester. This project provides for \$1.875 million (total) to create this multiagency center within the Interstate 287 corridor known as the Cross Westchester Expressway.

**Project Location :**

Westchester County, New York

**Partner(s) :**

New York State DOT

**Start Date:**

July 1995

**End Date:**

September 2000

**Estimated Total  
ITS Funds:**

\$1,500,000

**Estimated Total  
Project Cost:**

\$4,988,000

**Contacts:**

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Ed Roberts	New York State DOT	(518) 457-1232	



# MAGIC (METROPOLITAN AREA GUIDANCE INFORMATION & CONTROL)

**Description:** Deployment of MAGIC (Metropolitan Area Guidance Information & Control) system will divert motorists from congested or emergency/incident locations to alternative routes. The system will be implemented in three construction phases.

**Project Location :** Northern New Jersey

**Partner(s) :** New Jersey DOT

**Start Date:** January 1992

**End Date:** December 1999

**Estimated Total  
ITS Funds:** \$10,280,000

**Estimated Total  
Project Cost:** \$106,280,000

## Contacts:

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Bob Dibartolo	New Jersey DOT	(609) 530-2551





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## MONITOR

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**Description:**

MONITOR is Milwaukee's Freeway Traffic Management System. The MONITOR build-out is a \$40 million investment in the Operations of the Milwaukee Area Freeway and Arterial System. FY 1998 funding will contribute to MONITOR Stage VI Construction, MONITOR Software, and the Traffic Incident Management Enhancement Program. MONITOR Stage VI will implement various equipment that was not placed in operation during the five previous stages, including the last 15 of 120 ramp meters. An Independent Software Advisor will assist in the oversight and direction of all TOC software development activities. MONITOR Software will be upgraded to make the existing system year 2000 compliant. Stage A of the MONITOR Software Upgrade will be funded, including the software coding for the Regions' Traveler Information HUB. New Enhanced Freeway Patrol Service will begin in Washington, Ozaukee and Waukesha Counties, and existing service patrols will be expanded in Racine and Kenosha Counties.

**Project Location :** Southeastern Wisconsin

**Partner(s) :** Wisconsin DOT

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**Start Date:** October 1998

**End Date:** October 2001

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**Estimated Total  
ITS Funds:** \$6,000,000

**Estimated Total  
Project Cost:** \$6,875,000

**Contacts:**

John Berg	FHWA Wisconsin Division, HDA-WI	(608) 829-7515
Philip DeCabooter	State of Wisconsin DOT	(608) 267-0452



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## NEW JERSEY TURNPIKE PROJECT

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**Description:** This project supports the expansion of the New Jersey Turnpike Automatic Traffic Surveillance and Control System. The project will install and evaluate additional closed circuit television locations, variable message signs and a weather surveillance subsystem.

**Project Location :** New Jersey

**Partner(s) :** New Jersey DOT and New Jersey Turnpike Authority

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**Start Date:** July 1995

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$2,625,000

**Estimated Total  
Project Cost:** \$11,200,000

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### Contacts:

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Dom Critelli	New Jersey State DOT	(609) 530-2462

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# SYRACUSE, NEW YORK ADVANCED TRANSPORTATION MANAGEMENT SYSTEM

## **Description:**

This project will deploy an Advanced Transportation Management and Traveler Information System in the vicinity of the State Fair Interchange in Syracuse, involving I-690, Route 695, and key connecting roadways. The system is expected to include technologies such as variable message signs and highway advisory radio and state-of-the-art traffic monitoring and a management system to operate this area.

## **Project Location :**

Syracuse, New York

## **Partner(s) :**

New York State DOT

## **Start Date:**

October 1998

## **End Date:**

January 2003

## **Estimated Total ITS Funds:**

\$1,000,000

## **Estimated Total Project Cost:**

\$1,250,000

## **Contacts:**

Jerry Zell	FHWA New York Division, HTS-NY	(518) 431-4125	Ext. 228
Jim Lawler	New York State DOT	(315) 428-4312	



# **Transit Management Systems**

# COMPUTER INTEGRATED TRANSIT MAINTENANCE AND ENVIRONMENT (CITME)

**Description:**

The project, funded in previous years, will provide transit properties with the tools to assist in modernizing their maintenance operations. This \$1 million earmark will be used to implement the system designed in Phase I in the bus operations area. The functional specifications for this system have been developed by a research team led by South Carolina Research Associates (SCRA) for installation at the Greater Cleveland Regional Transit Authority's bus and rail maintenance facilities. SCRA expects that CITME will reduce the costs of transit maintenance by 15-25 percent. Current funding will be used to procure software/hardware necessary to install ITS systems in Cleveland's bus operations division. Funding for the third phase, if available, will be used to procure and/or design hardware/software for rate and facilities operations.

**Project Location :** Cleveland, Ohio

**Contractor(s) :** Greater Cleveland Regional Transit Authority, South Carolina Research Associates (SCRA)

**Start Date:** December 1997

**End Date:** October 2000

**Estimated Total ITS Funds:** \$1,000,000

**Estimated Total Project Cost:** \$2,000,000

**Contacts:**

Stewart McKown	FTA Headquarters, TRI-12	(202) 366-0244
Michael York	Greater Cleveland Regional Transit Authority	(216) 566-5101
Richard Rentz	South Carolina Research Associates	(843) 760-3241



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## CHICAGO SMART INTERMODAL SYSTEM

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**Description:**

The Chicago Transit Authority (CTA) is deploying their Bus Emergency Communications System (BECS) and Bus Service Management System (BSMS). The BECS is a comprehensive communications base designed to support more effective delivery of bus service. New two-way voice and data radio system, and location capabilities are the main features of BECS. Under the BSMS, CTA is installing additional hardware and software modules to support Computer-Aided Dispatch (CAD) software, transit priority movements at five signalized intersections, electronic traveler information way-side signs at two major bus stops, and enhanced data reporting system. Modules are being installed only on buses assigned to the 77th street garage.

**Project Location :**

Chicago, Illinois

**Partner(s) :**

City of Chicago Department of Public Works and Department of Streets and Sanitation

**Start Date:**

July 1994

**End Date:**

June 2000

**Estimated Total  
ITS Funds:**

\$490,000

**Estimated Total  
Project Cost:**

\$3,640,000

**Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Yazeed Khayyat	Chicago Transit Authority	(312) 432-8006



# DALLAS AREA RAPID TRANSIT PERSONALIZED PUBLIC TRANSIT

## **Description:**

Dallas Area Rapid Transit (DART) is testing flexible-route buses on a regional crosstown route in the Dallas metropolitan area to determine if flexible service can increase ridership. By integrating DART's existing Automatic Vehicle Location (AVL) system and an off-the-shelf Computer Aided Dispatch (CAD) software, slack in a bus' schedule can be calculated. If there is sufficient slack, a fixed-route bus may deviate and pick up off-route passengers at a designated location. DART's Geographical Information System (GIS) is used to identify the exact location of the off-route passenger pick-up point. The maximum route deviation is one mile.

## **Project Location :**

Dallas, Texas

## **Partner(s) :**

Dallas Area Rapid Transit (DART), University of Texas at Arlington, and Texas Southern University

## **Start Date:**

September 1994

## **End Date:**

August 2000

## **Estimated Total ITS Funds:**

\$391,560

## **Estimated Total Project Cost:**

\$391,560

## **Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Koorosh Olyai	DART	(214) 749-2866



# SMART FLEXROUTE INTEGRATED REAL-TIME ENHANCEMENT SYSTEM (SAFIRES)

## **Description:**

The Potomac and Rappahannock Transportation Commission (known as OmniRide - A ride for All Reasons) is conducting an operations test to evaluate an integrated smart vehicle service that includes route-deviation, fixed route, and demand responsive service types. The test site is a suburban-to-rural environment in the Prince William area of Virginia, located twenty-five miles south of Washington, D.C.

Using Intelligent Transportation Systems (ITS) technologies including a global positioning satellite-based (GPS) automated vehicle location (AVL) system, real-time scheduling software, geographic information system (GIS) mapping, and digital communication through mobile data terminals (MDT), the test will integrate route deviation, commuter rail and bus, feeder bus, and human service transportation in a low density environment.

Small, multi-purpose vehicles will switch between service types on an as-needed basis, allowing the best vehicle to respond to each request in real-time using the integrated computerized dispatching software developed for the operational test. ITS technologies will also greatly simplify section 15 reporting and tracking human service ridership and agency charges. It is hypothesized that this system will provide greater effectiveness and efficiency in serving the public transportation needs of the community than would be the case in a non-ITS enhanced environment.

Route deviation (up to 3/4 mile) will enable the service to reach a far larger market and negate the need for complementary paratransit services required of fixed route systems. The test, expected to involve up to 50 ITS enhanced vehicles and a dispatching center, is scheduled to last 30 months. It is anticipated that full deployment of ITS technologies will begin in early 1996.

**Project Location :** Northern Virginia

**Partner(s) :** Potomac-Rappahannock Transportation Commission (PRTC), Northern Virginia Planning District Commission (NVPDC), Virginia Department of Rail and Public Transportation (VDRPT), GMSI, Inc., Trapeze Software, Inc., and SG Associates

**Start Date:** January 1994

**End Date:** May 1999

**Estimated Total ITS Funds:** \$1,214,460

**Estimated Total Project Cost:** \$5,134,071





**Contacts:**

Irv Chambers	FTA Headquarters, TRI-11	(202) 366-0238	
Bob Thomas	FHWA Virginia Division	(804) 281-5100	
Eric Marx	PRTC	(703) 490-4811	Ext. 117



# SUBURBAN MOBILITY AUTHORITY FOR REGIONAL TRANSPORTATION (SMART) PROJECT

**Description:**

Project activities will provide for a Dispatch System with automated reservations, scheduling and dispatch for paratransit operation, and an Automatic Vehicle Location (AVL) system to allow tracking the fleet. These capabilities will eventually be extended to affiliated agencies. The project will also establish an 800 number, interfaced with the dispatch system with potential to refer customers to regional paratransit services. The project will also develop interfaces with other ITS initiatives in the region, including FAST-TRAC and Michigan DOT's Metropolitan Transportation Center. The project will also provide for innovative Traveler Information Services, to tie other uses together.

**Project Location :** Detroit, Michigan

**Partner(s) :** Michigan DOT and Suburban (Detroit) Mobility Authority for Regional Transportation (SMART)

**Start Date:** February 1994

**End Date:** April 1999

**Estimated Total  
ITS Funds:** \$12,000,000

**Estimated Total  
Project Cost:** \$15,000,000

**Contacts:**

Morris Hoevel	FHWA Michigan Division, HDA-MI	(517) 377-1880	Ext. 32
Kimberly Johnson	Michigan DOT	(517) 373-8796	
Doreen Tyrrell	SMART	(313) 223-2121	



## WINSTON-SALEM MOBILITY MANAGEMENT - PHASE II

### **Description:**

This project supports the efforts of the city of Winston-Salem, NC, to operationally test the mobility management concept by extending the mobility management service throughout the paratransit fleet of nineteen (19) vehicles, and begins to link the service to the 58-vehicle fixed-route operations. Mobility management services and system specifications are being defined for the coordination of paratransit and fixed-route transit. Hardware and software is being obtained and installed for operational testing. An evaluation of the test will be conducted with results documented. A six-month evaluation of Phase-I (limited paratransit mobility management) revealed an increase of 32% in operating service hours, ridership increases of 18%, and a decrease in unit per hour cost of 13%.

### **Project Location :**

Winston-Salem, North Carolina

### **Partner(s) :**

Winston-Salem Transit Authority (WSTA), City of Winston-Salem, North Carolina DOT, and North Carolina State University's Institute for Transportation Research and Education

### **Start Date:**

June 1996

### **End Date:**

August 1999

### **Estimated Total ITS Funds:**

\$240,000

### **Estimated Total Project Cost:**

\$300,000

### **Contacts:**

William Wiggins	FTA Headquarters, TRI-11	(202) 366-0255
Nedra Woodyatt	Winston-Salem Transit Authority	(910) 727-2648
John Stone	North Carolina State University	(919) 515-7732



# **Incident Management Systems**

## NEW JERSEY POLICE COMMUNICATION CENTER

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### **Description:**

The purpose of this project is to establish a prototype law enforcement communications/patrol center on a site adjacent to the New Jersey Turnpike. The center will be capable of receiving traffic information and real-time VMS displays from the Turnpike's existing Automated Traffic Surveillance and Control System. The center will have the capability of disseminating this information to patrol vehicles via mobile data terminals (MDTs). The goals and objectives of this project include enhanced traffic management capability, improved response to incidents, improved efficiency of enforcement functions and improvement of the institutional relationship between State Police and traffic operations personnel.

### **Project Location :**

New Jersey

### **Partner(s) :**

New Jersey Turnpike Authority and New Jersey DOT

### **Start Date:**

September 1993

### **End Date:**

July 1999

### **Estimated Total ITS Funds:**

\$3,500,000

### **Estimated Total Project Cost:**

\$5,053,238

### **Contacts:**

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Dom Critelli	New Jersey State DOT	(609) 530-2462



# **Electronic Toll Collection**

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## DADE COUNTY EXPRESSWAY, FLORIDA TOLL COLLECTION SYSTEM

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**Description:** This project will provide electronic toll collection services to the Dade County Expressway.

**Project Location :** Miami, Florida

**Partner(s):** Miami-Dade County Expressway Authority

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**Start Date:** October 1998

**End Date:** TBD

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**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$81,000,000

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### Contacts:

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693	Ext. 228
Sam Gonzzles	Miami-Dade Expressway Authority	(305) 637-3277	

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## NEW JERSEY ELECTRONIC TOLL AND TRAFFIC MANAGEMENT

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**Description:** A single Electronic Toll and Traffic Management (ETTM) system to be deployed region-wide permitting use of a single "electronic tag" on vehicles on any toll facility throughout the region.

**Project Location :** Major New Jersey toll roads

**Partner(s) :** New Jersey DOT, South Jersey Transportation Authority, New Jersey Highway Authority, and New Jersey Turnpike Authority

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**Start Date:** January 1992

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$35,000,000

**Estimated Total  
Project Cost:** \$43,000,000

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### Contacts:

Keith Sinclair	FHWA New Jersey Division, HTC-NJ	(609) 637-4204
Dominick Critelli	New Jersey DOT	(609) 530-2462

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## NEW YORK CITY TOLL PLAZA SCANNERS

### **Description:**

This project will fund installation of readers for EZ-PASS tags (the transponders used to electronically collect tolls) along the highway portions that are currently not covered by the ongoing TRANSCOM project. These include: the Belt Parkway linking JFK airport, Van Wyck Expressway linking La Guardia Airport and leading to the Triboro Bridge, Whitestone Expressway, Grand Central Parkway, Clearview Parkway, and Cross Island Parkway. The information collected from the transponders will be integrated and coordinated with other regional systems to improve incident response and allow traffic management across a broader area of metropolitan New York City.

### **Project Location :**

New York City, New York

### **Partner(s) :**

New York State DOT

### **Start Date:**

October 1998

### **End Date:**

March 2002

### **Estimated Total ITS Funds:**

\$1,100,000

### **Estimated Total Project Cost:**

\$1,375,000

### **Contacts:**

Arthur O'Connor	FHWA New York Division, HTS-NY	(212) 466-3856
Fred Lai	New York State DOT	(718) 482-4733



# **Electronic Fare Payment Programs**

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# MULTI-USE SMART CARD SPECIFICATIONS AND GUIDELINES DEVELOPMENT

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**Description:**

This project will develop specifications and guidelines of multi-application electronic payment systems for transit operators. This project entails working closely with transit operators that are planning or implementing multi-application electronic payment systems to develop specifications and guidelines on the consensus of transit smart card applications and systems.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

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**Start Date:**

May 1998

**End Date:**

January 2000

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**Estimated Total ITS Funds:**

\$600,000

**Estimated Total Project Cost:**

\$600,000

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**Contacts:**

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366-6678
Mike Dinning	Volpe National Transportation Systems Center	(617) 494-3793
Leisa Moniz	Volpe National Transportation Systems Center	(617) 494-3793



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## NORTHERN VIRGINIA REGIONAL FARE SYSTEM

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**Description:**

This project supports the efforts of the Northern Virginia Transportation Commission to design a Regional Fare System. The system will integrate the fare collection operations of separate commuter rail, bus, and rail-commuter operators. The project is in concert with the Washington Metropolitan Area Transportation Authority's decision to implement the recently demonstrated "Go Card" throughout Washington, DC's Metrorail system. Building on this successful demonstration, this project will show how advanced fare systems can be used to facilitate the integration of fare systems of different transit operators. With passenger transfer rates (between the participating operators) of 30 - 40%, this site is well suited to demonstrate the benefits and passenger convenience of a seamless transportation system.

**Project Location :**

Northern Virginia

**Partner(s) :**

Northern Virginia Transportation Commission, Washington Metropolitan Area Transportation Authority

**Start Date:**

June 1997

**End Date:**

May 1999

**Estimated Total  
ITS Funds:**

\$200,000

**Estimated Total  
Project Cost:**

\$4,000,000

**Contacts:**

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366-6678
Heather Wallenstrom	Northern Virginia Transportation Commission	(703) 524-3322



## WILMINGTON, DELAWARE SMART DART

### **Description:**

This project was designed to operationally test smart card technology in a transit application in Wilmington, Delaware. A smart card fare collection system was to be developed for the Wilmington bus fleet. An Employee Commute Option (ECO) program was to be created that allowed employers to provide transit benefits through the smart card system which facilitates the administration of transit benefits. The ECO program was developed as a response to the Clean Air Act of 1992, and the program was intended to allow participating employers to qualify for the tax credits based on the level of employee participation in the program. The smart card was to be issued by a local bank as part of a larger pilot program testing an open-system stored-value bank card. The project, under this design was not initiated, and it is currently being redefined.

### **Project Location :**

Wilmington, Delaware

### **Partner(s) :**

Delaware DOT and Electronic Payment Services

### **Start Date:**

July 1994

### **End Date:**

May 2001

### **Estimated Total ITS Funds:**

\$1,191,424

### **Estimated Total Project Cost:**

\$2,179,155

### **Contacts:**

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366-6678
Gene Donaldson	Delaware State DOT	(302) 739-4301



# **Railroad Crossings**

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## RAILROAD HIGHWAY CROSSING - LONG ISLAND, NY

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**Description:** This project will support the development of a prototype integrated uniform warning system for use at railroad/highway grade crossings.

**Project Location :** Long Island, New York

**Partner(s) :** New York State DOT

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**Start Date:** April 1996

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$5,875,000

**Estimated Total  
Project Cost:** \$9,531,250

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### Contacts:

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Jeff English	New York State DOT	(518) 457-5521	



# **Regional Multimodal Traveler Information**



# ANALYSIS OF TRAVELERS' PREFERENCES FOR ROUTING

**Description:**

One strategy for using the roadway effectively is to provide traffic status information to assist travelers' route planning and scheduling. This expanded knowledge of options for departure time and route choice and rerouting will create a more effective use of the roadway infrastructure.

It is important for message providers to know which kinds of message content and format are sufficiently convincing to influence traveler decision making. One purpose of this project is to identify factors which influence decision criteria for departure times, routing and rerouting decisions particularly in commuting situations.

Empirically derived results bearing on these issues will be provided in at least two forms. One form will be a human factors handbook which furnishes guidance for the design and transmission of messages primarily for Advanced Traveler Information Systems. Empirical results will also be used in the development of realistic estimates of driver behavior needed for traffic models.

A literature review of driver information requirements has been performed. Research nearing completion includes human factors and traffic engineering laboratory analyses of information requested during traffic congestion.

**Project Location :** Maryland

**Contractor(s) :** Westat Corporation

**Start Date:** May 1995

**End Date:** September 1999

**Estimated Total ITS Funds:** \$1,323,199

**Estimated Total Project Cost:** \$1,323,199

**Contacts:**

Nazemeh Sobhi

FHWA-TFHRC, HSR-30

(703) 285-2907



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# DYNAMIC TRAFFIC ASSIGNMENT AND SYNTHETIC ORIGIN AND DESTINATION MATRICES

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**Description:**

This study will develop a deployable Real-Time Dynamic Traffic Assignment (DTA) system. The system shall be able to serve as an effective integrator between ATMS and ATIS and shall be deployable in real time in a large and congested network in which recurrent and non-recurrent congestion may occur. A DTA system should have the following broad functional capabilities:

- Estimate and predict traffic network states;
- Provide route guidance;
- Offer departure time and mode choice (e.g., transit vs. auto) advisory to travelers;
- Interface to traffic control systems.

A real-time DTA system will perform the above functions in real-time by making the best use of the information collected from surveillance systems and other information sources including ATIS.

This is a cost-sharing project collaborated with Oak Ridge National Laboratory (ORNL). The project is to be conducted in multiple phases. Phase I work focuses on the design, development, functional testing, and laboratory testing of the DTA system. Phase II work will address computational and system integration issues for real-time operations in a traffic management center. Phase III work will perform small scale experimental field testing to test robustness of the DTA system.

Two parallel Phase I research contracts were awarded to Massachusetts Institute of Technology and the University of Texas at Austin through ORNL in October, 1995. Both Phase I projects will be completed by May 1998. R&D activities for Phases II and III will be dependent on funding availability.

ORNL provides technical management support to the FHWA with the design, development, and testing of the DTA system.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Department of Energy and Oak Ridge National Laboratory

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**Start Date:** June 1994

**End Date:** September 1999

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**Estimated Total  
ITS Funds:** \$5,250,000

**Estimated Total  
Project Cost:** \$6,250,000

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**Contacts:**

Henry Lieu

FHWA - TFHRC, HSR-10

(703) 285-2410

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## WASHINGTON METROPOLITAN TRAVELER INFORMATION SERVICES PROJECT: REGIONAL IMPACTS MODELING

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**Description:** This project will measure the region-wide benefits of deploying the Washington Metropolitan Traveler Information Services Project. It will also create a model methodology for benefit estimation.

**Project Location :** Washington, DC Metropolitan Area

**Contractor(s) :** Virginia DOT/George Mason University

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**Start Date:** April 1997

**End Date:** December 2002

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**Estimated Total ITS Funds:** \$500,000

**Estimated Total Project Cost:** \$500,000

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### Contacts:

Jim Robinson	Virginia DOT-Richmond	(804) 786-6877
Roger Stough	George Mason University	(703) 993-2268

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## DIRECT

**Description:**

DIRECT (Driver Information Radio using Experimental Communication Technologies) is an Operational Field Test that deploys and evaluates several alternative low-cost methods of communicating advisory information to motorists. These include use of the Radio Broadcast Data System (RBDS)/FM subcarrier (SCA), Automatic Highway Advisory Radio (AHAR), Low Power Highway Advisory Radio (HAR), and cellular phones. The Michigan Intelligent Transportation Systems (MITS) Center collects traffic information from various sources, fuses the information and provides traffic advisory updates to travelers on an exception basis. Initial experimental testing involved 30 specially-equipped vehicles; subsequent testing is being conducted and involves additional volunteer vehicles using conventional equipment (HAR and cellular phones).

**Project Location :**

Along sections of I-75 and I-94 in the Detroit, Michigan area

**Partner(s) :**

Michigan DOT, General Motors, Ford, Chrysler, Delco, Ericsson/GE, AAA of Michigan, Ameritech, Orbacom, Metro Networks, University of Michigan, Capstone Consulting, ERIM

**Start Date:**

January 1994

**End Date:**

January 1999

**Estimated Total  
ITS Funds:**

\$2,500,000

**Estimated Total  
Project Cost:**

\$4,500,000

**Contacts:**

Dave Helman	FHWA Headquarters, HTV-3	(202) 366-8042	
Morrie Hoevel	FHWA Michigan Division, HDA-MI	(517) 377-1880	Ext. 32
Thomas Mullin	Michigan DOT	(313) 256-9800	



## HOUSTON SMART COMMUTER

### **Description:**

In the I-45 North Corridor, Metro is trying to entice travelers from Single Occupancy Vehicles (SOV) into buses by providing real-time transit and traffic information through personal digital assistants. Seven hundred test and control subjects are participating in the project. Metro is evaluating the test every six months.

In the I-10 West Corridor, Metro is trying to entice travelers from SOV into car and vanpools by providing a ridesharing service. During the first six months of testing, telephone operators assist in matching drivers and riders. After this phase, the project is evaluated. If successful, Metro plans on installing an automated ridesharing service.

**Project Location :** Houston, Texas

**Partner(s) :** Texas DOT, Houston Metro

**Start Date:** February 1993

**End Date:** April 2000

**Estimated Total  
ITS Funds:** \$2,500,000

**Estimated Total  
Project Cost:** \$5,000,000

### **Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Mark Olson	FHWA Texas Division, TA-TX	(512) 916-5966
Susan Beaty	Houston Metro	(713) 881-3029



## LYNX PASSENGER TRAVEL PLANNING SYSTEM

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**Description:**

This cooperative agreement is to support the efforts of the Central Florida Regional Transportation Authority (LYNX) to develop a transit component for their Passenger Travel Planning System. The project will develop a traveler planning center and install electronic bus stop displays and a vehicle location system, integrated with an existing signal pre-emption system. Electronic emitters will be installed in transit buses and will be read by existing electronic detectors at signalized intersections. The vehicle data will be relayed from the intersection to the Transportation Management Center, and to the transit operator, who will provide next-bus information to customers through bus stop displays. Vehicle data will also be used to monitor transit fleet performance and improve service.

**Project Location :** Central Florida

**Partner(s) :** Central Florida Regional Transportation Authority

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**Start Date:** January 1996

**End Date:** September 1999

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**Estimated Total  
ITS Funds:** \$240,000

**Estimated Total  
Project Cost:** \$300,000

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**Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667	
Ann Joslin	Lynx	(407) 841-2279	Ext. 3204

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## MIAMI REAL-TIME PASSENGER INFORMATION SYSTEM

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**Description:**

This project will support the efforts of the Miami-Dade Transit Agency (MDTA) to provide customers with an automated trip planning capability, including real-time on-line route and schedule information. Informational kiosks will be established at major rail and bus transfer points. In consultation with the FTA, a post-implementation evaluation will be accomplished.

**Project Location :**

Metropolitan Dade County, Florida

**Partner(s) :**

Miami-Dade Transit Agency (MDTA)

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**Start Date:**

July 1995

**End Date:**

July 1999

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**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$400,000

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**Contacts:**

W. Raymond Keng

FTA Headquarters, TRI-11

(202) 366-6667

Rosie Perez

MDTA

(305) 375-4325

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# NEW YORK CITY METROPOLITAN TRANSPORTATION AUTHORITY TRAVEL INFORMATION SYSTEM

## **Description:**

The Travel Information System will supplement a pilot project for a GPS-based bus locating system. This bus locating system will involve approximately 200 buses that will be assigned in the CBD of Manhattan. These will include North/South and East/West destinations. This proposed program will outfit 250 major bus stops with travel information devices. The three types of information devices will be dispersed as follows:

\* 50 interactive kiosks will be installed at major bus stop points. This may include numerous transfer points between railway routes, subway routes and other bus routes. Highly visible and tourist areas will be utilized for two reasons: 1) maximum usage of the kiosk and 2) provide vital information to the tourist who is unfamiliar with the transit system.

\* 100 video monitors will be mounted at major bus stops with transfer points to the other bus routes or subway lines. Voice announcements will also be available for the visually impaired. These monitors will be mounted in vandal-proof housings. Some storefront window locations (i.e., banks, department stores) will be made available.

\* 100 variable message signs will be installed at high volume bus stops (i.e., near schools, hospitals and shopping centers).

\* 50 vehicles will be equipped with message displays/interactive stations and appropriate voice announcements for the visually impaired.

## **Project Location :**

New York Metro Area

## **Partner(s) :**

Westinghouse, Rockwell, and Luminator

## **Start Date:**

September 1994

## **End Date:**

September 2000

## **Estimated Total ITS Funds:**

\$3,000,000

## **Estimated Total Project Cost:**

\$5,029,460

## **Contacts:**

W. Raymond Keng

FTA Headquarters, TRI-11

(202) 366-6667

Mark Bartlett

FHWA New York Division, HDA-NY

(518) 431-4129



## TRAVINFO

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**Description:**

The TravInfo project will implement a comprehensive, region-wide traveler information system, capable of supplying transportation information to a broad array of devices and users. TravInfo includes the development and operation of a multi-modal transportation information center that will integrate transportation information from a wide variety of sources and make the information available to the general public, public agencies and commercial (value-added) vendors. TravInfo will pursue an "open-access" architecture for all aspects of the system to provide for future growth and facilitate the transfer of technology.

**Project Location :**

San Francisco Bay Area, California

**Partner(s) :**

California DOT (CalTrans), Bay Area Ad Hoc ITS Committee, PATH, and Metro Transportation Commission

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**Start Date:**

April 1993

**End Date:**

March 1999

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**Estimated Total  
ITS Funds:**

\$5,072,000

**Estimated Total  
Project Cost:**

\$7,347,000

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**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Melanie Crotty	Metro Transportation Commission	(510) 464-7708

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# ADVANCE CORRIDOR TRANSPORTATION INFORMATION CENTER

## **Description:**

ADVANCE (Advanced Driver and Vehicle Advisory Navigation Concept) was an operational test designed to evaluate the performance of a large-scale in-vehicle navigation and dynamic route guidance system. Vehicles used in this project served as probes, providing real-time traffic information to a Traffic Information Center (TIC). Upon completion of the operational test, the ADVANCE Steering Committee concurred in the further development and modification of the ADVANCE TIC (application phase of ADVANCE) so it can serve as a prototype Corridor Transportation Information Center (C-TIC) for information dissemination efforts for the Gary-Chicago-Milwaukee (GCM) ITS Priority Corridor. The C-TIC development includes initiatives to integrate the IDOT Traffic Systems Center/Communications Center and the WisDOT MONITOR travel time and lane closure information, automate \*999 and integrate incident information from several sources. A prototype of the Illinois State Toll Highway Authority I-PASS advanced traffic management system has been developed to provide travel time information for I-355 as part of the C-TIC effort and expansion of this system to the entire tollway network is currently underway. The deployment of the prototype C-TIC will be completed in June 1998. The prototype C-TIC will gradually evolve into the multi-modal traveler information system through interconnection with communication hubs for Indiana DOT, Illinois DOT, Illinois transit, and Wisconsin DOT.

## **Project Location :**

Northeastern Illinois

## **Partner(s) :**

Indiana DOT, Illinois DOT, Wisconsin DOT, Illinois State Toll Highway Authority

## **Start Date:**

January 1997

## **End Date:**

June 2001

## **Estimated Total ITS Funds:**

\$9,884,839

## **Estimated Total Project Cost:**

\$12,356,048

## **Contacts:**

Dave Helman	FHWA Headquarters, HTV-3	(202) 366-8042
Pete Olson	FHWA Illinois Division, HPP-IL	(217) 492-4634
Jeff Hochmuth	Illinois DOT	(847) 705-4800



## CUMBERLAND GAP TUNNEL, KENTUCKY

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**Description:**

This project is to install an Advanced Traveler Information System to reroute traffic, especially truck traffic, around the Cumberland Gap Tunnel during events that shut down access. The tunnel is located in a remote, mountainous part of the state, accessed only by a single highway with no parallel routes. This system will include variable message signs, highway advisory radio, speed volume detectors, and communications equipment.

**Project Location :**

Cumberland Gap, Kentucky

**Partner**

Kentucky Transportation Cabinet

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**Start Date:**

October 1998

**End Date:**

TBD

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**Estimated Total  
ITS Funds:**

\$1,550,000

**Estimated Total  
Project Cost:**

\$1,937,500

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**Contacts:**

Al Alonzi	FHWA Kentucky Division, HDA-KY	(502) 223-6729
Simon Cornett	Kentucky Transportation Cabinet	(502) 564-3020



## INGLEWOOD, CALIFORNIA ATMS PROJECT

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**Description:**

The Inglewood, California, ATMS project builds upon existing transportation resources and encompasses the installation of a sophisticated traffic control center that controls traffic signals, conducts traffic surveillance using closed circuit TV, and provides up to the minute information on traffic to travelers through kiosks, changeable message signs, cable TV and the Internet. The project will reduce travel time in the area 20-30% before and after NBA basketball games, NHL hockey games, concerts, and other special events at the Forum, Hollywood Park Racetrack and Casino.

**Project Location :**

Inglewood, California

**Partner(s) :**

California DOT; City of Inglewood, CA

**Start Date:**

September 1997

**End Date:**

December 2000

**Estimated Total  
ITS Funds:**

\$1,000,000

**Estimated Total  
Project Cost:**

\$1,000,000

**Contacts:**

Pam Marston	FHWA-LA Metro Office	(213) 202-3955
John West	CALTRANS	(916) 654-8877



## INTEGRATED CORRIDOR MANAGEMENT

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**Description:**

This project is being conducted by the New Jersey DOT in cooperation with the Pennsylvania DOT and the Delaware Valley Regional Planning Commission. Project components include a multi-jurisdictional clearinghouse for regional traffic information, similar to the TRANSCOM operation in Northern NJ/NY, and a study of the overall traffic and incident management needs in southern New Jersey and the Philadelphia metropolitan area.

**Project Location :**

Southern New Jersey and Philadelphia Metropolitan Area

**Partner(s) :**

New Jersey DOT

**Start Date:**

August 1992

**End Date:**

June 1999

**Estimated Total  
ITS Funds:**

\$6,000,000

**Estimated Total  
Project Cost:**

\$7,500,000

**Contacts:**

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Kurt Aufschneider	New Jersey DOT	(609) 866-4980



## KANSAS CITY, MISSOURI INTERMODAL COMMON COMMUNICATIONS TECHNOLOGY

**Description:** This project will result in the design and integration of ITS intermodal communication technology for deployment as part of the ITS Transportation Management System under development in the Kansas City area.

**Project Location :** Kansas City, Missouri

**Partner(s) :** Missouri DOT, Kansas City Metropolitan Planning Organization

**Start Date:** October 1998

**End Date:** March 2000

**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$1,250,000

### Contacts:

Bob Thomas	FHWA Missouri Division, HDP-MO	(573) 636-7104
Sabin Yanez	Missouri DOT	(816) 889-6450
Matt Volz	Kansas DOT	(413) 296-6356



# MARKET STREET AND PENNSYLVANIA CONVENTION CENTER PASSENGER INFORMATION CENTER

## **Description:**

This project will fund the design and construction of a comprehensive "way finding" system that provides transit system directional signage. It will utilize on-line computerized electronic information signage and graphics, with user-activated personalized service regarding both the resources in Philadelphia and specific information on public transit facilities.

## **Project Location :**

Philadelphia, Pennsylvania

## **Partner(s) :**

Redevelopment Authority of Philadelphia

## **Start Date:**

October 1998

## **End Date:**

March 1999

## **Estimated Total ITS Funds:**

\$325,000

## **Estimated Total Project Cost:**

\$450,000

## **Contacts:**

Carmine Fiscina	Philadelphia FHWA Metro Office	(215) 656-7070
Janet Kampf	Philadelphia FTA Metro Office	(215) 656-7070
Christopher Kern	Redevelopment Authority of Philadelphia	(215) 209-8659





## NATIONAL CAPITAL REGION CONGESTION MITIGATION

### Description:

The effort consists of a variety of projects as described below:

- \$1.25 million for the development of a suburb-to-suburb bus service between Tysons Corner and Bethesda; (Administered and managed by FTA)
- \$1.5 million toward the deployment of a travelers' information center in Prince George's County in Maryland; (End Date: 6/2000; Total Funds: \$1.875M)
- \$250,000 for a multi-jurisdictional transportation telecommunications study; (End Date: 9/99; Total Funds: \$312,500)
- \$500,000 to enhance video surveillance in Montgomery County and the Tysons area to support the Tysons to Bethesda bus service; (End Date: 1/2000; Total Funds: \$625,000)
- \$750,000 for George Mason University to assist in the Partners In Motion project as well as to establish an ITS implementation center at the university; (Administered and managed by R&D)
- \$1.25 million to enhance surveillance on the Virginia portion of the capital Beltway, and enhance VDOT's existing advanced freeway management system software in Northern Virginia; (End Date: 4/2002; Total Funds: \$1,562,500)
- \$100,000 for the development of an electronic fare payment services implementation plan for the National Capital Region; (End Date: 4/2002; Total Funds: \$125,000) and
- \$400,000 to provide support for the region's ITS Task Force activities. (End Date: 4/2002; Total Funds: \$500,000).

### Project Location :

Washington, DC Metropolitan Area

### Partner(s):

Virginia DOT, Maryland State Highway Administration, Montgomery Co. Maryland Department of Public Works, and Prince Georges County Maryland Department of Public Works

### Start Date:

October 1998

### End Date:

April 2002

### Estimated Total ITS Funds:

\$6,000,000

### Estimated Total Project Cost:

\$7,000,000

### Contacts:

Tom Jacobs	FHWA Maryland Division, HDA-MD	(410) 962-4342	Ext 129
Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107	
James R. Robinson	Virginia DOT	(804) 786-6677	
Mike Zezeski	Maryland SHA	(410) 787-5859	
Rick Gordon	Prince Georges County DPW	(301) 883-5700	
Emil Wolanin	Montgomery County DPW	(301) 217-2208	



# NEW YORK THRUWAY AUTHORITY ALBANY TRAFFIC OPERATIONS CENTER

## **Description:**

The New York State Thruway will develop and implement integrated transportation workstations. Initial installations will be at Thruway headquarters in Albany. These workstations will tie together highway advisory radio, variable message signs, closed circuit television, and computer-aided dispatching technologies throughout New York State.

## **Project Location :**

Albany, New York

## **Partner(s) :**

New York State Thruway Authority

## **Start Date:**

March 1996

## **End Date:**

June 1999

## **Estimated Total ITS Funds:**

\$1,500,000

## **Estimated Total Project Cost:**

\$1,875,000

## **Contacts:**

Michael Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Ray Davis	New York State Department of Transportation	(518) 457-1232	
Barry Solomon	New York State Thruway Authority	(518) 436-2756	



# PENNSYLVANIA TURNPIKE TRAVELER INFORMATION SYSTEM

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**Description:**

This project will provide for the development and deployment of a traveler information system for the Pennsylvania Turnpike. Components to be deployed include highway advisory radio systems, variable message signs, closed circuit television, and a central computer control system capable of controlling all new as well as existing equipment. The project will include retrofitting existing equipment as necessary to enable integration with the central computer control system.

**Project Location :**

Pennsylvania

**Partner(s) :**

Pennsylvania DOT/Pennsylvania Turnpike Commission

**Start Date:**

September 1997

**End Date:**

July 2001

**Estimated Total  
ITS Funds:**

\$9,000,000

**Estimated Total  
Project Cost:**

\$11,250,000

**Contacts:**

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517	
Tim Scanlon	Pennsylvania Turnpike Commission	(717) 939-9551	Ext. 5590



## SMART CORRIDOR

### **Description:**

The SMART Corridor is a joint operational project located along 12.3 miles of the Santa Monica freeway corridor in Los Angeles. The objectives of the Smart Corridor are to provide congestion relief, reduce accidents, reduce fuel consumption, and improve air quality. This will be accomplished using advanced technologies to advise travelers of current conditions and alternate routes (using communication systems such as Highway Advisory Radio (HAR), Changeable Message Signs (CMS), kiosks, and teletext), improving emergency response, and providing coordinated inter-agency traffic management. The freeway systems will be operated by the State and the arterial streets by the City, with coordination provided via voice communications and electronic data sharing.

### **Project Location :**

Los Angeles, California

### **Partner(s) :**

Los Angeles County Transportation Commission, California DOT (CalTrans), and the City of Los Angeles

### **Start Date:**

July 1991

### **End Date:**

December 1999

### **Estimated Total ITS Funds:**

\$1,100,000

### **Estimated Total Project Cost:**

\$50,000,000

### **Contacts:**

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## WASHINGTON, D.C. - PARTNERS IN MOTION (TRAVELER INFORMATION PROJECT)

### **Description:**

This project will implement a regional traveler information system which will become the source for a broad range of information about transportation conditions in the region. The brainchild of a coalition of public transportation agencies throughout the region, the Regional Traveler Information Project will offer the traveling public less wasted time and less travel-related stress than what they currently experience. It will also enable public transportation agencies to share information among themselves more effectively which, in turn, can help them better coordinate their operations.

### **Project Location :**

Washington, DC Metropolitan Area

### **Partner(s) :**

Virginia DOT, Maryland SHA, District of Columbia DPW, Federal Highway Administration, Federal Transit Administration, Maryland Mass Transit Administration, Montgomery County DPW&T, Prince George's County DPW&T, Metropolitan Washington Airports Authority, Metropolitan Washington COG, Washington Metropolitan Area Transit Authority, Maryland-National Capital Park and Planning Commission, City of Alexandria DPW, City of Fairfax, Arlington County DPW, Dulles Area Transportation Association, Northern Virginia Transportation Commission, Fairfax County Office of Transportation, Potomac Rappahannock Transportation Commission, Loudon County Department of Planning, National Park Service, Tysons Transportation Association, Virginia Department of Rail & Public Transportation, Prince William County DPW&T, and Virginia Railway Express

### **Start Date:**

September 1996

### **End Date:**

December 2002

### **Estimated Total ITS Funds:**

\$7,000,000

### **Estimated Total Project Cost:**

\$12,500,000

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## **Integrated Systems – Priority Corridors**

## HOUSTON ITS PRIORITY CORRIDOR

### **Description:**

The Houston partnership has been working together over a number of years to develop transportation management and ITS initiatives in Houston. A fully-developed, truly multimodal transportation management system serving needs such as provision of traveler information, public transportation and ridesharing, and commercial vehicle-oriented elements is envisioned. Early efforts focused on the on-going "Smart Commuter" project, and current initiatives will further enhance effective utilization of Houston's extensive network of HOV lanes, park and ride lots, transit centers, and intermodal facilities. With I-45 / I-10 as key core elements, the Priority Corridor planning process is covering all major transportation elements, with a potential highlight being creation of an ITS showcase focus within the northwest quadrant surrounding the US 290 freeway facility. Anticipated completion dates for these projects are included below where appropriate.

The Houston Priority Corridor has identified the deployment of Incident Management and Traveler Information projects as their priorities. All current projects are moving toward deployment. All future projects will be deployment of ITS technologies.

The "Smart Commuter" project, discussed separately in this publication, is being coordinated with other efforts in the Corridor. A number of additional projects have been approved or submitted for approval as part of the Houston Priority Corridor Immediate Action Program (FY93-95):

**EVALUATION OF ASTRODOME AREA CCTV LEASE** - The objective is to install closed circuit television on freeways and arterials that serve the Astrodome area to monitor traffic operations during special events as well as normal travel times. To accelerate the installation, the project has leased the video system from a private vendor and uses leased fiber optic cables to transmit the video (February 1995 through August 2000).

**DEVELOPMENT OF CORRIDOR PROGRAM PLAN** - The Plan is envisioned as a living document which will be annually reviewed and updated based upon both experience with deployed projects and evolving state-of-the-art ITS (July 1995 with annual updates).

**AVI FOR TRAFFIC CONDITIONS AND INCIDENT DETECTION (PHASE 4)** -This project will expand the installation of AVI to include High Occupancy Vehicle (HOV) lane access points from the Park and Ride and transit terminal facilities for shuttle bus operations and arterial streets that can serve as alternate routes to the freeway system. In addition, the freeway AVI system will be augmented with sample stations to test the application of AVI as an incident detection system.

**CHANGEABLE LANE ASSIGNMENT SYSTEM ON U.S. 290 FRONTAGE ROADS** - This project will design, install, and evaluate eleven dynamic lane assignment control systems that can alter the left turn lane assignments at intersections based on time-of-day traffic demands (February 1996).

**PUBLIC INFORMATION AND PROGRAM ADMINISTRATION** - The Program Administration office is responsible for the management, coordination, and technical administration of the Priority Corridor Program.



**MONITOR/WARNING SYSTEMS FOR FREEWAY TO FREEWAY CONNECTIONS** - The objective of this project is to implement a system which identifies unsafe speed conditions, which vary by vehicle size and weight, and initiates warning devices to prevent accidents by these vehicles.

**REAL-TIME INFORMATION KIOSKS** - This project will deploy and test the use of real-time kiosks at activity centers to enhance the travel decision-making process of commuters and travelers. The focus is on providing improved information to transit and roadway system users to help them select the best travel mode, travel route, and time of travel.

**RAILROAD GRADE CROSSING MONITORING SYSTEM** - The objective of this project is to examine how information systems and traffic control systems can be used to monitor the movements of trains to adjust traffic patterns and advise emergency vehicles accordingly in the corridor to reduce delays at railroad grade crossings.

**AVL FOR INCIDENT MANAGEMENT** - The application of a fleet management system is essential for coordinated and effective operation of the Motorist Assistance Program (MAP). Quick response and effective dispatching of these units can reduce the time for emergency response and the time needed to restore normal traffic operations. The objective is to increase the effectiveness of incident management by implementing an AVL system which identifies MAP vehicles and their locations on a real-time basis.

**IN-VEHICLE NAVIGATION/INFORMATION APPLICATIONS** - The objective of this project is to provide current information on travel conditions to travelers at all stages of their trip. Decision points for alternate routes exist at several points in the corridor - two of which are within the Houston Intercontinental Airport. The scope is limited at this time to simple map information, selection of the best route, and an update of travel conditions on selected freeways and at critical decision locations.

**ENVIRONMENTAL CONDITIONS MONITORING SYSTEMS** - The Houston area is subject to unpredictable and severe weather conditions that can result in extensive roadway flooding during periods of intensive rainfall. The objective of this project is to investigate the potential to integrate weather and roadway flooding information into the Advanced Traveler Information System (ATIS).

**CHANGEABLE LANE ASSIGNMENT SYSTEM AT SELECTED INTERSECTIONS** - This project expands the deployment strategy to include traffic responsive operation between the traffic signal control system and the Changeable Lane Assignment System (CLAS) at two or three arterial street intersections in Harris County.

**INTEGRATED CORRIDOR ATMS/ATIS** - The concept and objective of the integrated corridor is to focus appropriate ITS technologies into coordinated management systems for future deployment as part of the Priority Corridor program. The core infrastructure developed in the Integrated Corridor will provide the ability to monitor traffic conditions, operate traffic control systems, and communicate current operational conditions to travelers.

**WASHBURN TUNNEL ATMS/ATIS** - This project will implement automatic incident detection and closure systems for the tunnel and develop traveler information services to





advise travelers of conditions at the tunnel. An integrated, area-wide traffic management and traveler information system is proposed.

**TRAFFIC MANAGEMENT AND TRAVELER INFORMATION FOR CRITICAL ROADWAY LINKS** - This project will focus ITS on critical roadway system links where incidents and construction can have a severe impact on the traveling public. Each targeted critical link severe as an evacuation route for hurricane evacuation.

**ITS TECHNOLOGY FOR DATA COLLECTION AND TRANSPORTATION PLANNING** - This project will develop a system to facilitate use of the database at Houston TranStar for planning purposes. Vehicles may also be equipped with GPS, AVL, and AVI on-board technology to collect real-time traffic data for incorporation into a GPS.

**INTEGRATING TRANSIT INFORMATION SYSTEM INTO TRANSTAR** – This project will integrate real-time transit information into TranStar.

**PROGRAM ADMINISTRATION** – Continuing support for years 3 - 5 of the Houston Priority Corridor program.

**EN-ROUTE TRANSIT INFORMATION SYSTEM** - This project will provide an infrastructure capable of identifying a moving transit vehicle by a roadside transponder and using the vehicle's identity to trigger an appropriate bi-directional exchange of transit rider information and vehicle data with the roadside device.

**ITS ENHANCED INCIDENT MANAGEMENT** - This project includes Total Station Accident Investigation Surveying Devices, Development of Incident Management Command Vehicle, Laptop Computers with CAD software for officers, and Live Video Transmission to Dispatch Centers.

**AUTOMATIC TRAFFIC MANAGEMENT IN FLOOD PRONE AREAS** – Existing and new water level detectors will be integrated into TranStar.

**DISSEMINATION OF INFORMATION** - Focus on the distribution of the following information in a variety of formats: Freeway Travel Speed Map, Travel Speed Map Text information, and Flood Control Map.

**COORDINATED RAMP METERING AND INTERSECTION TRAFFIC SIGNAL CONTROL** - This project would deploy and evaluate concepts and strategies for inter-relating traffic signal and ramp metering signal operations. Operational concepts would include routine operating conditions and incident management conditions.

**CONDITION RESPONSIVE UPTOWN TRAVELER INFORMATION SYSTEM** - This joint public/private sector project will develop improved way-finding systems to enhance the mobility and convenience of traveling for workers, shoppers, and visitors. Technologies may include static signing, CCTV surveillance, variable message signing, kiosks, cellular phone hotline, HAR, and INTERNET information.

**AUTOMATED INCIDENT MANAGEMENT STRATEGIES AND SUPPORT SYSTEMS** -



This project will pre-plan "response scenarios" for freeway incidents which would take advantage of the integrated transportation management systems at TranStar.

INTEGRATION OF PRIORITY CORRIDOR PROJECTS INTO TRANSTAR - Houston's "Principal Integrator" will be responsible for the overall development of TranStar computer systems and will coordinate system integration and deployment to insure that all systems can function within the standards, guidelines, and established architecture.

**Project Location :** The Houston Metropolitan area in Harris County, Texas

**Partner(s) :** The Texas DOT, Houston METRO, The City of Houston, and Harris County have formed a partnership, named TranStar, to guide transportation management and ITS activities.

**Start Date:** January 1993

**End Date:** On-going

**Estimated Total  
ITS Funds:** \$18,502,000

**Estimated Total  
Project Cost:** \$22,202,000

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## I-95 NORTHEAST CORRIDOR

### **Description:**

The purpose of the I-95 Northeast Corridor is to test, showcase and deploy a variety of ITS services in the Corridor. The Coalition completed development of an initial "Business Plan" in May 1993. Updated in mid-1995, mid-1996, and again in early 1998, this plan, which is complemented by a Strategic Plan, is the cornerstone of the Coalition's program management. A number of feasibility, operational testing, and deployment activities are underway as listed below (project completion dates in parentheses). Current information on Coalition activities can be found on web site at <http://www.i95coalition.org>

**Information Exchange Network** - This project interconnects the corridor agencies into single, dedicated information exchange network for improved communication (December 1996 with on-going support).

**Incident Management** - This project developed uniform incident management techniques throughout the Corridor, including coordinated multi-agency response (December 1996).

**Surveillance Requirements/Technology** - This project has developed a plan for implementation of a cost-effective, seamless, Corridor-wide surveillance system with state-of-the-art technologies. This system will serve as a platform for development, testing, and deployment of advanced technologies, and for integrating private sector initiatives with government operated systems (August 1995).

**Commercial Vehicle Operations** - This project developed a Corridor CVO program that coordinates on-going agency, State, Federal, Motor Carrier, and private sector CVO initiatives. An operational test of an automated traveler information system for commercial vehicles will also be developed (December 1996).

**Public/Private Sector Outreach** - This Project determines the barriers and opportunities for private sector participation in Coalition activities and develop uniform policies and procedures as necessary to promote public/private partnering (on-going).

**User Needs and Marketability** - This project surveyed the needs of Corridor travelers and determining whether or not a commercial market exists for ATIS services in the Corridor (July 1996).

**Traveler Information Services** - This project ultimately seeks to provide improved traveler information services in the Corridor through a variety of dissemination methods. A feasibility study was completed in December 1995. An operational test in this area got underway in 1997. (December 2000).

**Coordinated VMS/HAR Strategies** - The ultimate goal of this project is to provide real-time and consistent traveler information throughout the Corridor using variable message signs (VMS) and highway advisory radio (HAR) as dissemination media. A needs definition and feasibility study was completed in July 1995, and an operational test to evaluate the technical and cost effectiveness of operating HAR stations in a coordinate fashion has been initiated (March 2000).

**Technology Exchange and Training** - The objectives of this project are to upgrade overall



skill levels of agency staff; use staff skills and knowledge to train others; disseminate up-to-date technical information; and act as a showcase for software, hardware, and program elements (on-going).

Intermodal Outreach and Information Exchange - This project seeks to expand Coalition membership to attract additional intermodal members and improve technical and institutional coordination between members representing the various modes (June 1996).

Corridor-Wide AVI/ETTM Strategy - This project developed a long term strategy for achieving ETTM compatibility in the Corridor (February 1997).

Regional Information and Coordination Centers - This project studied the feasibility and develop recommendations regarding regional coordination of Coalition activities. (April 1997).

Long Range Strategic Plan - This project developed the Coalition's first Strategic Plan (June 1995).

Rural Mayday/800 Call-In System - This project will test the feasibility of using cellular phones or in-vehicle devices to expedite reporting of incidents and emergencies in rural areas (April 1997).

Long Term Financing - This project identified a stable and predictable source of funding to support Coalition activities that is capable of addressing Federal and Coalition member requirements, while allowing flexibility to address changing Coalition needs (February 1997).

NTCIP for VMS - This operational test will evaluate the National Transportation Communications for ITS Protocol (NTCIP) for use with VMS (completion date TBD).

Training – The objective of this project is to create an integrated ITS education and Training Program. A consortium of Universities located within the Coalition states is being established that may provide graduate and undergraduate level courses, as well as skill-based training and technology transfer. (March 2000).

CVO ATIS (Fleet Forward) - This project tests the feasibility of enhancing motor carrier safety and operational efficiency by providing information to improve carrier routing and dispatching. (December 1998).

CVO Roadside Safety - This project will test an information exchange system designed to help motor carrier enforcement officials focus roadside inspections and enforcement on high-risk motor carriers (December 1999).

CVO Electronic Registration - This project will test an information system designed to help State agencies streamline credentials administration (December 1999).

CVO Electronic Clearance - This project will test mainline electronic screening and clearance of commercial vehicles by mobile enforcement units (December 1999).



CVO Safety Management - This project will develop a prototype of a comprehensive, performance-based motor carrier safety management program that will reduce highway accidents and incidents in the I-95 Corridor (December 1999).

Corridor coalition activities also involve consultant support services, use of volunteer support staff from member agencies, and a number of immediate deployment action projects.

**Project Location :**

Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Virginia

**Partner(s) :**

Coalition Members: The Departments of Transportation in Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, New York City, Pennsylvania, Rhode Island, Vermont, and Virginia. Also members are the Delaware River & Bay Authority, Delaware River Port Authority, Delaware Turnpike Administration, Maine Turnpike Authority, Maryland Transportation Authority, Massachusetts Turnpike Authority, New York State Thruway, New York Metropolitan Transportation Authority, New Jersey Highway Authority, New Jersey Turnpike Authority, Pennsylvania Turnpike Commission, Port Authority of New York & New Jersey, South Jersey Transportation Authority, and Triborough Bridge & Tunnel Authority. In addition, other agencies in the transportation community in the Northeast participate as affiliate members.

**Start Date:** May 1993

**End Date:** On-going

**Estimated Total  
ITS Funds:** \$40,789,318

**Estimated Total  
Project Cost:** \$54,793,967

**Contacts:**

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# MIDWEST (GARY-CHICAGO-MILWAUKEE) ITS PRIORITY CORRIDOR

## **Description:**

The States of Indiana, Illinois, and Wisconsin have formed a coalition to apply ITS in the Priority Corridor connecting Gary, Chicago, and Milwaukee (i.e. the "GCM Corridor"). Multi-state agreements have been signed and the coalition is working closely with the US DOT and local, multi-modal organizations operating transportation systems in the corridor. An Executive and Technical Committee structure has been established to involve appropriate management and technical level representatives.

Using I-80, I-90, and I-94 as a backbone, the corridor has been broadly defined to encompass the 16 contiguous urbanized counties in the three States. The corridor extends over some 130 miles and covers more than 2,500 square miles. All major freeways, tollways, arterials, transit systems, airports, ports and intermodal facilities are being identified as part of the corridor planning process.

The coalition's consultant team, in its efforts to develop a Corridor Program Plan (CPP), used focus groups, surveys, interviews, and worked closely with the Technical Committee to identify the transportation problems or "user needs" in the corridor, along with potential ITS remedies through a variety of multi-modal ITS "User Services". The initial CPP was approved by the Executive Committee in June, 1995, and was updated in July, 1997. It presents near-term (1-2 year) and longer-term (3-20 year) projects for the implementation, management and evaluation of a multi-state, multi-modal ITS corridor program. The CPP identifies 10 program areas:

- \* Multi-Modal Traveler Information System
- \* Integrated Transit System
- \* Incident Management Programs
- \* GCM Technical and Planning Support
- \* Traffic Management Systems
- \* Commercial Vehicle Operations
- \* Traffic Signal Integration
- \* Vehicle Transponder Systems
- \* Advanced Incident Reporting and Mayday Security
- \* Private/Public Partnerships.

In accordance with the CPP, the GCM Priority Corridor is currently implementing Year-1 projects. Efforts are underway to update the CPP to identify future Year-3 and Year-4 projects.

Some projects currently underway include:

Development of Regional Strategic Plans, Corridor Strategic Plan and Corridor Architecture

On-Board Vehicle Warning System for Railroad Grade Crossings pilot test

Expansion and Enhancements of the Indiana Hoosier Helpers Program - this effort includes the hiring and training of new staff members, expansion of coverage to 24 hours/day, and purchasing of additional patrol vehicles. An expert system is being developed to extend the wireless communication system installed under the Borman Expressway project to support the transmission of closed-circuit video, data, and location information directly from incident scenes. This expert system will be capable of identification and notification of the proper emergency response agencies.



Equipment Upgrade of the Illinois Emergency Traffic Patrol - the current emergency traffic patrol fleet is being equipped with quick-tow devices which enable operators to safely and expeditiously relocate disabled vehicles to a safe location off of the highway system without having to exit the patrol vehicle. This will significantly decrease both the exposure of the operator to dangerous roadway conditions and the time required to clear minor accidents.

#### Wisconsin Integrated Corridor Operations Study and Operational Test

The GCM Priority Corridor is currently developing a Public Information Center. This center will serve as a centralized source of information for all GCM Corridor initiatives. The center will include a 800-telephone voice mail information line to serve public inquiries.

#### **Project Location :**

Lake, Porter, and Laporte counties in Indiana; McHenry, Lake, Kane, Cook, Dupage, and Will counties in Illinois; and Washington, Ozaukee, Waukesha, Milwaukee, Walworth, Racine, and Kenosha in Wisconsin.

#### **Partner(s) :**

Chicago Area Transportation Study, Illinois DOT, Indiana DOT, Illinois State Toll Highway Authority, Milwaukee County Public Works, Northern Indiana Commuter Transportation District, Northwest Indiana Regional Planning Committee, Regional Transportation Authority, Southeast Wisconsin Regional Planning Committee, Wisconsin DOT, Argonne National Laboratory, Chicago Transit Authority, City of Chicago DOT, City of Milwaukee, Marquette University, Metra, and Milwaukee County Transit and Pace

**Start Date:** January 1993

**End Date:** On-going

**Estimated Total ITS Funds:** \$18,690,000

**Estimated Total Project Cost:** \$23,362,499

#### **Contacts:**

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## SOUTHERN CALIFORNIA CORRIDOR

### **Description:**

Transportation agencies within the Southern California Priority Corridor have organized into four coalitions generally bounded by the jurisdictions of the California Department of Transportation (CalTrans) Districts 7, 8, 11, and 12. These coalitions are called Regional ITS Coordinating Teams. Each team provides representatives to the Corridor Steering Committee. The teams work at the management level to form plans, strategies and project lists to present to their respective constituents and parent organizations; set priorities and facilitate and possibly endorse publicly funded ITS projects within the region. Membership generally represents CalTrans district, city, county, Metropolitan Planning Organization, transit agency, Highway Patrol, and Air Quality Management District.

The Corridor Steering Committee is the forum to address corridor-wide user services, functional requirements, architecture and standards to ensure compatibility as deployments progress and merge at regional boundaries. The Committee provides an interactive point of contact for other California and ITS planning efforts.

Three major categories of activity are in progress in the Southern California Corridor. Operational tests, strategic deployment and planning, and a major demonstration of an intermodal transportation management and information system known as "Showcase".

Projects encompassed by the Southern California Corridor include:

- \* Integrated Ramp Metering/Adaptive Signal Control
- \* SCOOT Adaptive Traffic Control System
- \* Mobile Communications System
- \* Smart Call Box
- \* Spread Spectrum Radio Traffic Interconnect
- \* SMART Corridor
- \* Los Angeles Smart Traveler
- \* Ontario Smart Vehicle (ATHENA) - Phase I Demonstration will develop a preliminary design for a demonstration of door-to-door shared rides using 100 vans equipped with "Smart Technology" and will evaluate technologies and interfaces, leading to a procurement to implement the actual demonstration.

Strategic Planning - A strategic deployment planning study in the broadly defined S.

California Priority Corridor will evaluate and plan what technologies will be programmed for deployment, and define an architecture that is consistent with the national architecture. The planning study began in 1995 and was completed in mid-1997.

"Showcase" Intermodal Transportation Management and Information System (ITMIS) and Early Start Projects - The Intermodal Transportation Management and Information System (ITMIS) project will deploy an intermodal transportation management and information system to optimize and coordinate freeway and street operations with public and private transportation systems within the corridor. Cooperative effort will be established in areas such as system management, transportation demand management, transportation provision and fleet management.





Traveltip, the first ITMIS project being developed and deployed under the Showcase initiative, was funded in fiscal year 1995 and will provide for an interregional multimodal advanced traveler information system in the Orange County region.

The project will deploy technology used to improve traffic and transit operations, and provide information to transportation managers, travelers, and third party users to enhance decisions on transportation management, route selection, and mode choice. Traveltip is basically a smaller version of what is envisioned for the entire corridor.

Within the Showcase concept, early start projects are also being identified and developed in addition to the main effort of developing a corridor wide ITMIS. Four projects for the San Diego area have been identified and funded in fiscal year 1995 through the Showcase Early Start Program. These projects are: 1.) Transit Management Information System (Phase I), 2.) Emergency Computer Assisted Dispatch, 3.) Jack Murphy Stadium Traveler and Traffic Information System, 4) San Diego Intermodal Transportation Management and Information System (Phase I).

**Project Location :**

Southern California: This area lies within major urbanized and adjacent non-urbanized areas of Ventura, Los Angeles, San Bernadino, Riverside, and San Diego Counties and all of Orange County.

**Partner(s) :**

Steering Committee: Caltrans Headquarters New Technology, CalTrans District 7, Caltrans District 8, CalTrans District 11, CalTrans District 12, Southern California Association of Governments, San Diego Association of Governments, San Bernardino Association of Governments, Orange County Transportation Authority, City of San Diego, California Highway Patrol, and the South Coast Air Quality Management District

**Start Date:** January 1993

**End Date:** On-going

**Estimated Total  
ITS Funds:** \$21,655,846

**Estimated Total  
Project Cost:** \$110,000,000

**Contacts:**

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**Integrated Systems –  
Metropolitan Model Deployment Initiatives**

# NEW YORK-NEW JERSEY-CONNECTICUT (TRANSCOM) ITS INFRASTRUCTURE MODEL DEPLOYMENT

## **Description:**

The New York City metropolitan area Model Deployment will showcase ITS infrastructure to millions of local commuters, commercial vehicle operators, and other travelers. TRANSCOM, the lead organization, is a consortium of fourteen transportation and public safety agencies from throughout the region. The widely dispersed public agencies will implement a Regional Transportation Management System connecting member agencies through a "virtual" Transportation Management Center. A contractor will operate a Multimodal Traveler Information System that will include personalized information to the public for a fee, eventually becoming self-supporting.

## **Project Location :**

New York City metropolitan area, NY/NJ/CT

## **Partner(s) :**

TRANSCOM, New York State Department of Transportation, and the Northeast Consultants

## **Start Date:**

October 1996

## **End Date:**

December 1999

## **Estimated Total ITS Funds:**

\$10,610,000

## **Estimated Total Project Cost:**

\$15,067,648

## **Contacts:**

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Robert Bamford	TRANSCOM	(201) 963-4033	



# PHOENIX, ARIZONA AZTECH MODEL DEPLOYMENT INITIATIVE

## **Description:**

The Phoenix AZTech Model Deployment Initiative will integrate the Trailmaster Freeway Management System, seven local area city Traffic Signal Operations (TOCs) along identified priority corridors, City of Phoenix Public Transit Department management and dispatching system, Maricopa County Emergency Management System, Sky Harbor International Airport management/information system and electronic fare systems associated with the City of Phoenix Public Transit Department and Sky Harbor International airport for a truly regional, multimodal transportation management system. This will be accomplished by adding hardware to and modifying software within local TOCs to accommodate interoperability and extending the communications from Trailmaster to the local TOCs. In addition, the corridors will be instrumented with additional sensors and incident detection (CCTVs) to support the measurement of traffic volume, flow rate and the rapid detection and clearance of incidents.

As part of the Model Deployment Initiative, the City of Phoenix Public Transit will instrument their transit vehicles with Automatic Vehicle Location (AVL) so that these vehicles can be used as traffic probes and to monitor schedule adherence.

The Model Deployment Initiative will develop a traveler information system to collect, fuse, package and deliver multimodal traveler information to the public via a variety of mechanisms. Jurisdictional ITS linkages utilizing the Arizona DOT (ADOT) communications network will provide sharing of corridor status, travel times, hazard information and corridor closure information among state, county and city systems. The AZTech Integrated Regional Traveler Information Center will be established at the ADOT TOC and will be developed by TRW.

ETAK, with its partner Metro Networks, Inc., will manage AZTech, and will promote business development of fee paying clients. Distribution channels include dial-up telephone (free), public kiosk (free), INTERNET (free, except for access fee paid by users), for-fee cellular, for-fee paging, and for-fee interactive cable TV. The public will receive the benefit of for-fee distribution of traveler information via Metro Networks traffic center to broadcast TV, cable TV, and radio stations. For those broadcast TV and radio stations desiring standard traveler information only available from public sources, it will be made available through existing ADOT interface to broadcast stations. Traveler information will include corridor, public transit, and airport information, as well as electronic Yellow Pages supplied by commercial clients.

Evaluation, training, public relations, education and outreach will also be carried out under Model Deployment Initiative efforts.

The Phoenix AZTech Model Deployment Initiative will be operational by July 1998. A year of data collection will follow to evaluate the benefits of an integrated metropolitan area ITS infrastructure. The final evaluation report will be available in December 1999.

## **Project Location :**

Phoenix, Arizona

## **Partner(s) :**

Arizona Department of Transportation, Maricopa County, Cities of Phoenix, Tucson, Chandler, Glendale, Mesa, Scottsdale and Tempe; Regional Public Transit Authority, Phoenix Transit Department, Maricopa Association of Governments, Pima Association of Governments, Arizona State University, Sky Harbor International Airport, TRW Transportation Systems, Scientific Atlanta, Inc., and the Etak Team (which may include the following companies: Metro Networks, CUE Paging Corp., Differential Corrections, Inc., SEIKO Communications, Inc., SkyTel, Hewlett Packard, Fastline, Clarion, Delco Electronics, Volvo, IT Network, and ATT)



**Start Date:** October 1996

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$7,520,000

**Estimated Total  
Project Cost:** \$18,450,000

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# SAN ANTONIO, TEXAS TRANSGUIDE METROPOLITAN MODEL DEPLOYMENT

## **Description:**

The San Antonio, Texas metropolitan area Model Deployment builds on the successful TransGuide Operations Center, where the Texas Department of Transportation, the city traffic operations, transit dispatch, police traffic dispatch and police/fire/emergency dispatch are all co-located. The fully integrated TransGuide Model Deployment will cover nearly 200 miles of freeways and the majority of streets within the San Antonio metropolitan area. 78,000 vehicles will be equipped with Intelligent Vehicle Tags. These tags will allow the equipped vehicles to serve as roving "traffic probes," reporting on current travel times throughout the metropolitan area. Real-time, multi-modal traveler information will be provided to the traveling public through TransGuide TV 54, an in-vehicle route guidance system, kiosks, the INTERNET, and highway advisory radio. The TransGuide communications system will support video teleconferencing between local trauma centers and EMS units, providing physicians with the opportunity to see the patient and directly monitor vital statistics at the accident scene and en-route to the hospital.

The San Antonio Model Deployment will be fully operational by September 1998. A year of data collection will follow to evaluate the benefits of a fully integrated metropolitan area ITS infrastructure. The final evaluation report will be available by September 2000.

**Project Location :** San Antonio, Texas

**Partner(s) :** Texas Department of Transportation, VIA Metropolitan Transit Authority, City of San Antonio Department of Public Works, City of San Antonio Police Department, City of San Antonio Fire Department, Alpine Electronics Research of America, Amtech Systems Corporation, Southwest Research Institute, Navigation Technologies, Scientific Atlanta, Fatura, Zexel USA, and H.B. Zachry

**Start Date:** October 1996

**End Date:** September 2000

**Estimated Total  
ITS Funds:** \$7,144,000

**Estimated Total  
Project Cost:** \$13,954,500

## **Contacts:**

Toni Wilbur	FHWA Headquarters, HTV-3	(202) 366-2199
Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Tom Newbern	Texas Department of Transportation	(512) 416-3200
Pat Irwin	Texas Department of Transportation - San Antonio	(210) 731-5249



# SEATTLE, WASHINGTON SMART TREK MODEL DEPLOYMENT

## **Description:**

The Seattle, Washington Smart Trek Model Deployment Initiative will showcase the implementation of the ITS infrastructure to commuters both around the world and especially to the Seattle area residents. The traveling public and local officials will see and experience the benefits of a 21st century transportation system in a real-life setting. The Seattle Smart Trek Model Deployment project will provide intermodal transportation management and integrated, real-time highway and transit information services for the entire Seattle metropolitan area.

The Seattle Model Deployment Initiative was operational in December 1997. A year of data collection will follow to evaluate the benefits of an integrated metropolitan area ITS infrastructure. The final evaluation report will be available December 1999.

**Project Location :** Seattle, Washington

## **Partner(s) :**

Smart Trek is a coalition of public and private partners joining together to develop this model deployment initiative. The partners include: Bartizan American Communications, Battelle Pacific Northwest Laboratories, Boeing Company, City of Bellevue Transportation Department, David Evans and Associates, Inc., Etak Inc., Fastline, IBI Group, ICON, King County Department of Transportation, Metro Traffic Control, Inc., Microsoft, Inc., Pacific Rim Resources, Inc., PB/Farradyne Inc., Seiko Communications Systems, Inc., Puget Sound Regional Council, TRAC-UW, Transportation Division Seattle Engineering Department, University of Washington, Washington State Department of Information Services, Washington State Department of Transportation, XYPOINT Corporation, and Greater Redmond Transportation Management Association

**Start Date:** October 1996

**End Date:** December 1999

**Estimated Total  
ITS Funds:** \$13,688,000

**Estimated Total  
Project Cost:** \$54,826,000

## **Contacts:**

Dan Schierer	FHWA Headquarters, HTV-3	(202) 366-4672
Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Pete Briglia	Washington State DOT	(206) 543-3331



# **Integrated Systems – Integrated Programs**



## MINNESOTA GUIDESTAR PROGRAM

### **Description:**

Minnesota Guidestar provides overall direction to the Minnesota Department of Transportation's ITS program by providing a focus for strategic planning, project identification, project initiation, project management, and evaluation. Minnesota Guidestar also provides coordination with other State and local agencies in Minnesota, such as the University of Minnesota, which have an interest and role in ITS.

In addition to the national ITS operational field tests described elsewhere (Evaluating Environmental Impacts Using LIDAR, Advanced Rural Transportation Information and Coordination, Genesis, Travlink, and Trilogy), the Minnesota Guidestar program manages a number of locally important operational field tests and a large ITS research program jointly with the University of Minnesota, Center for Transportation Studies, Intelligent Transportation Systems Institute. Some of these projects are described below, and others are under development.

**INTEGRATED CORRIDOR TRAFFIC MANAGEMENT (ICTM)** - This project is evaluating the ability of multiple agencies to manage freeways and arterials in a heavily traveled corridor as a "seamless" system using real-time adaptive control systems covering street signal systems and the freeway ramp metering system. Installation of the first phase equipment is underway, with subsequent phases of work initiated in early 1996. Full operation of the test started in 1997.

**POLARIS** - The Polaris project will produce a statewide ITS architecture defining an integrated system of ITS technologies for providing user services in Minnesota. The project began in July, 1995, and was completed in December, 1996.

**DURING INCIDENTS VEHICLES EXIT TO REDUCE TRAVEL TIME (DIVERT)** - This project will provide traffic guidance and control during freeway incidents, by managing traffic through coordinated signal timing plans along designated streets in downtown St. Paul. The diverted traffic added to the streets is accommodated in a planned fashion, as opposed to traffic randomly entering downtown St. Paul. The test phase of the project began in January, 1995.

**PORTABLE TRAFFIC MANAGEMENT SYSTEMS (PTMS)** - This project used a portable electronic traffic management system including changeable message signs, CCTV, portable signal systems, cellular and spread-spectrum radio communications, and a lap-top commuter monitor and control system to manage traffic associated with several sporting events and the Minnesota State Fair. The PTMS has resulted in a package of devices which can be deployed in fairly short notice to manage traffic where no existing surveillance and control systems. The evaluation report was completed in July, 1995.

**ADAPTIVE URBAN SIGNAL CONTROL AND INTEGRATION (AUSCI)** - The objective of this project is to implement an adaptive signal control algorithm for the existing traffic control system in Minneapolis, and also integrate with the existing ramp metering systems along I-394 and I-94. This project is in the design phase.

**SMARTDARTS** - The SmartDARTS Project will measure the benefits of a combination of



advanced technologies within a paratransit environment. Objectives of the project include: improved responsiveness; increased capacity; and increased cost effectiveness. The test portion of the project began in July, 1995.

#### IN-VEHICLE SIGNING SYSTEM FOR SCHOOL BUSES AT RAIL-HIGHWAY

**CROSSINGS** - This project will bring together key parties to develop the infrastructure, system electronics and in-vehicle units for the first in-vehicle signing system. This will serve to increase safety by: removing uncertainty about driving conditions; assessing the driver in the decision making process; and easing the overall driving task in general. The project was completed in May, 1997.

**MAYDAY PLUS** - This project will demonstrate significant, measured reductions in the times taken to reach victims of rural motor vehicle accidents through enriching the information made available to emergency service providers, thereby reducing response times, improving safety and saving lives. The 18 month test phase of the project began in January, 1996.

**ST. PAUL ADVANCED PARKING INFORMATION SYSTEM** - The Advanced Parking Information System is designed to provide motorists with real-time information regarding the status of parking facilities plus directions for the best routes to open parking facilities using automated variable message signs and static signs. Testing of the system began in January, 1996.

**DULUTH TRANSPORTATION OPERATIONS CENTER** – The purpose of the Duluth Transportation Operations Center is to cooperatively enhance traffic management and traveler information capabilities in order to increase the safety and efficiency of the transportation system in the Duluth area. The geography of the Duluth area presents unique challenges to the motorist, rapidly changing weather conditions, rugged terrain, limited alternate routes and peak tourist volumes often times make travel difficult. There is a need to furnish motorists with timely information as to road/weather conditions, events, alternate routes, provide swift incident response and have a central location for information on all modes of transportation. The goals of the Duluth Transportation Operations Center are to develop an expandable traffic management system, deploy a real-time traveler/weather information system, establish a framework for interagency cooperation for incident response and operation/maintenance of traveler information systems and to integrate transit operations into a Traffic Management System.

**ST. CLOUD TRANSPORTATION OPERATIONS CENTER** – This project will improve the signal operations and maintenance in the St. Cloud metro area by reviewing the existing practices of the city, county, and state then implementing actions to address these issues. Examples of issues to be addressed are: signal coordination, signal repair, monitoring of signals, jurisdictional boundaries, etc. It will also provide travel information to the public via real-time messages on site and other means that are to be established. Seasonal congested areas, construction information, and winter weather closures on I-94 are some areas that are being reviewed for information needs.

**SOUTHWEST AND WEST-CENTRAL MINNESOTA TRANSIT LINK PROJECT** – The need to access regional centers is a crucial link to maintain the region's population and economic vitality. The three transit programs have been working together to expand access to common regional centers and coordinate services for the best service level at the lowest operational costs. This endeavor requires a high-level of fast, reliable and simple communication between each system and common local data management practices and



parallel data operating systems.

**ROCHESTER TRANSPORTATION OPERATIONS CENTER** – The focus of this project is to improve safety and relieve congestion along the Highway 14/52 corridor in Rochester. One component of this project includes a six-month study which will be used to develop a comprehensive and detailed concept plan for ITS in the Highway 14/52.

**MANKATO TRANSPORTATION OPERATIONS CENTER** – The project combines real time traveler information and data collection with traffic management and operational features. The three primary goals of this project are to provide positive traffic control on Interstate 90 from Albert Lea to the South Dakota State Line during adverse weather conditions, manage the traffic signal systems in the Mankato area as well as provide traveler information for special events/incidents, and provide real time traveler and operational information for the public transit systems in the District 7 area.

**MOORHEAD AREA INTEGRATED TRAIN DETECTION AND TRAFFIC CONTROL SYSTEM** – The purpose of the Moorhead Area Integrated Train Detection and Traffic Control System Project is to develop an integrated system for detection of trains so that special timing plans can be selected when trains are approaching and when trains are present. It will also provide travelers and dispatchers with information on the train movements. This system is needed in Moorhead because an average of 70 trains per day pass through the City of Moorhead on tracks that cross many local and arterial streets at-grade. The average passage time is four minutes at each intersection for a total of about 4 hours and 40 minutes per day. The current traffic signal system has only some intersections with localized railroad preemption.

**IVI SNOWPLOW DEMONSTRATION PROJECT** – Minnesota's heavy snow, blowing snow, and ice impact travel. These impacts include crashes, stalls and stranded travelers, abandoned vehicles, travel delays and increased time for emergency vehicles to respond to incidents or to transport sick or injured persons. The societal costs, including deaths, injuries, property damage, lost productivity, etc., of these impacts are significant.

**STATEWIDE ADVANCED TRAVELER INFORMATION SYSTEMS SUPPORT** – The purpose of the Statewide Advanced Traveler Information Systems (ATIS) Support Project is to develop an overall strategy and design for the creation of a statewide advanced traveler information system. This will incorporate the individual ATIS efforts throughout the state into a cohesive system where they will cooperatively enhance the traveler information capabilities throughout the state. There is a need to furnish motorists with timely information as to road/weather conditions, events, alternate routes, provide swift incident response and have a central location for information on all modes of transportation.

**COMMERCIAL VEHICLES INFORMATION SYSTEMS AND NETWORKS (CVISN)** – The Minnesota CVISN pilot project was one of seven CVISN pilot project states to be selected as prototype states. The CVISN Model Deployment Program will focus on increased safety and efficiency through electronic integration of CVO information systems. The CVISN project will enhance Minnesota's information systems by creating open electronic data interchange standards and interfaces for all CVISN systems. It will provide safety information distribution at the roadside, electronic application for credentials, electronic clearinghouses for the payment of the registration tax and fuel tax, along with the electronic clearance of trucks at fixed and mobile enforcement sites.

**UNIVERSITY OF MINNESOTA ITS RESEARCH PROJECTS** – Various research projects will be conducted at the University of Minnesota under the auspices of Guidestar. The research areas which may be pursued based on a selection process include: Traveler Services; Traffic Management, Maintenance Operations, Vehicle Technologies, Safety and Human Factors; Modal and Rural Issues; Infrastructure Systems, Societal and



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Environmental Issues.

**Project Location :** Statewide throughout Minnesota

**Partner(s) :** Minnesota DOT is lead and other partners include: Federal, State and local agencies and private companies interested in the evaluation and deployment of ITS user services and technologies.

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**Start Date:** January 1991

**End Date:** On-going

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**Estimated Total  
ITS Funds:** \$30,000,000

**Estimated Total  
Project Cost:** \$72,000,000

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**Contacts:**

James McCarthy	FHWA Minnesota Division, HPO-MN	(612) 291-6112
Linda Taylor	ICTM: Minnesota DOT	(612) 582-1461
Ray Starr	Polaris: Minnesota DOT	(612) 582-1439
Ben Osemenam	DIVERT: Minnesota DOT	(612) 296-8557
Marthand Nookala	PTMS: Minnesota DOT	(612) 296-8557



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## SOUTHERN STATE PARKWAY

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**Description:**

This program is closely aligned with the INFORM project, which is now operating within Long Island. It is expected that surveillance, control and traveler information techniques will expand on those currently used in INFORM to take advantage of state-of-the-art hardware/software systems. The State has initiated the program with an investigation into how this work should be coordinated with INFORM, along with opportunities to tie the management system into facilities which approach the I-95 corridor at the western end of Long Island.

Two specific projects are also being conducted as part of this program. The Traffic Flow and Visualization Control (TFVC) project investigated a video-based vehicle detection, visualization and management system which employs leading edge technology developed in the military. Through the user of advanced video data processing, neural network analysis and intelligent command and control technologies, the traffic adaptive system will identify and alert the system operator to real-time traffic conditions such as recurring congestion, non-recurring incidents, and other traffic problems normally associated with freeway operations. The system has been successfully demonstrated in the laboratory and was field tested at thirty locations along the Long Island Expressway as part of the INFORM corridor. This program was handled as an element in the Southern State Parkway program through an interagency agreement with the U.S. Air Force. One of the national labs, Rome Laboratory, is being utilized as the project manager.

A second project developed a traffic congestion forecasting model for the INFORM System. This project supported the development of a computerized traffic forecasting model by the Brookhaven National Laboratory. The model is called ATOP for Advanced Traffic Occupancy Prediction. The model will eventually take on-line traffic data from INFORM system roadway sensors on Long Island and make projections as to future traffic patterns using the following routines:

- \* Statistical forecasting of traffic flow and occupancy using long and short term information
- \* Estimation of the relationships between traffic flow and occupancy
- \* Statistical detection and classification of anomalies and their impact on highway capacity
- \* Adaptive correction and updating to control prediction errors

The final report, titled "Traffic Congestion Forecasting Model for the INFORM System," is available from the National Technical Information Service and ITS America. The final report for the Traffic Flow and Visualization Control Project has been submitted through FHWA channels.

**Project Location :**

Long Island, New York

**Partner(s) :**

New York State Department of Transportation, USAF Rome Laboratory, Brookhaven National Laboratory

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**Start Date:**

September 1993

**End Date:**

December 1999

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**Estimated Total  
ITS Funds:** \$13,420,000

**Estimated Total  
Project Cost:** \$31,212,500

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**Contacts:**

Mike Schauer	FHWA New York Division, HTS-NY	(518) 431-4125	Ext. 236
Ed Roberts	New York State DOT	(518) 457-1232	

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# TRANSCOM CONGESTION MANAGEMENT PROGRAM

## **Description:**

TRANSCOM (Transportation Operations Coordinating Committee) is a consortium of 15 transportation and public safety agencies in the New York, New Jersey and Connecticut area whose goal is to improve inter-agency response to traffic incidents. A number of project initiatives have been undertaken to support this goal, and to advance the use of ITS-related technologies in the metropolitan area, and others are under development. These include:

- Regionwide initiatives for coordinated deployment and operation of variable message signs, highway advisory radio, and enhanced traffic monitoring including closed-circuit television.
- Development of an "ITS Regional Implementation Strategy," a program for coordinated implementation of ITS throughout this complex, multi-jurisdictional metropolitan area.
- An enhanced traffic advisory/diversion system at the intersection of the New Jersey Turnpike and Garden State Parkway; which will focus on alternate routing for New Jersey Transit buses.
- Expansion of traffic monitoring along the I-287 Tappan Zee Bridge corridor.

Operational tests being conducted under this program (TRANSMIT, Alternate Bus Routing) are described elsewhere in this document.

## **Project Location :**

New York, New Jersey

## **Partner(s) :**

New York State DOT, New Jersey DOT, TRANSCOM and other member agencies

## **Start Date:**

January 1990

## **End Date:**

On-going

## **Estimated Total ITS Funds:**

\$17,325,000

## **Estimated Total Project Cost:**

\$21,700,000

## **Contacts:**

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231	
Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Roy Gustavason	New Jersey DOT	(609) 530-2604	



## **Integrated Systems – Individual Projects**



# INTELLIGENT TRANSPORTATION SYSTEMS – POLICY, OPERATIONS AND SYSTEMS RESEARCH CENTER

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**Description:**

This project will provide an evaluation of the Smartraveler Project and its impact on the Washington Metropolitan area. The project will develop a coordinated plan for multi-year research to be conducted by the Urban Transportation Consortium comprised of George Mason University, the University of Virginia and Virginia Polytechnic Institute. This activity will lay the foundation for a six-year, \$2 million per year Urban Transportation Consortium project funded by U.S. DOT's Research and Special Programs Administration. George Mason University will develop corridor-specific planning models for the I-66 and I-81 corridors for the Fairfax Planning Commission and focus on ITS institutional policy issues. The University of Virginia will concentrate on ITS Systems Engineering issues, while Virginia Polytechnic Institute will focus on research relating to ITS operations and intelligent infrastructure.

**Project Location :**

Fairfax County, Virginia

**Partner(s) :**

George Mason University, University of Virginia & Virginia Polytechnic Institute

**Start Date:**

September 1998

**End Date:**

October 1999

**Estimated Total  
ITS Funds:**

\$750,000

**Estimated Total  
Project Cost:**

\$939,000

**Contacts:**

David Gibson	FHWA - TFHRC, HSR-10	(703) 285-2407
Roger Stough	George Mason University	(703) 993-2281



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## NORTH DAKOTA STATE UNIVERSITY ADVANCED TRAFFIC ANALYSIS CENTER

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**Description:**

The purpose of this project is to establish a center to provide a facility at which traffic analysis can be performed for second-tier cities (approximately 50,000-400,000 population). The center will also serve as a testbed at which systems designs developed at the center can be tested and demonstrated. These demonstrations can be used in conjunction with the simulation environment to offer effective training and hands-on experience for transportation professionals and elected officials. After four years, the center is intended to achieve financial independence by conducting research and service for second-tier cities. The center will create a simulated environment that will allow effective evaluation of existing and proposed traffic control plans using available software and hardware.

**Project Location :**

Fargo, North Dakota

**Partner(s):**

North Dakota State University

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**Start Date:**

October 1998

**End Date:**

TBD

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**Estimated Total  
ITS Funds:**

\$600,000

**Estimated Total  
Project Cost:**

\$600,000

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**Contacts:**

Raj Ghaman

FHWA - TFHRC, HSR-10

(703) 285-2408

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## FAST-TRAC

### Description:

FAST-TRAC (Faster and Safer Travel through Traffic Routing and Advanced Controls) will combine Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS) technologies in Oakland County, Michigan. SCATS, the Australian adaptive real-time traffic control system is being installed throughout Oakland County, Michigan. Traffic detection for real-time traffic control is being provided through the Autoscope video image processing technology. For the ATIS portion of the test, vehicles were equipped with the Siemens Ali-Scout route guidance system and other drive information systems (Quick-Scout and TetraStar/PathMaster). Infrared beacons installed at critical locations in the network provided for a continuous exchange of real-time traffic and route guidance information. A Traffic Operations Center has been established, not only as the heart of FAST-TRAC operations, but also as the focus for systems integration.

### Project Location :

Oakland County, Michigan

### Partner(s) :

Michigan DOT, Siemens Automotive, General Motors, Ford, Chrysler, Road Commission for Oakland County, County of Oakland, AWA Traffic System - America, and University of Michigan

### Start Date:

June 1992

### End Date:

June 2000

### Estimated Total ITS Funds:

\$56,410,000

### Estimated Total Project Cost:

\$70,512,500

### Contacts:

Dave Helman	FHWA Headquarters, HTV-3	(202) 366-8042	
Morrie Hoevel	FHWA Michigan Division, HDA-MI	(517) 377-1880	Ext. 32
Gary Piotrowicz	Road Commission for Oakland County	(248) 858-7250	



# MONTGOMERY COUNTY ADVANCED TRANSPORTATION MANAGEMENT SYSTEM

## **Description:**

This project will enhance Montgomery County's Advanced Transportation Management System to provide integrated transit and traffic capabilities. The system will include an automatic vehicle location-equipped bus fleet, intelligent in-vehicle units, two-way communications, real time graphics, relational database, monitoring, and control software, transit priority and system information dissemination. Through use of this enhanced information and control capability, the County's Advanced Transportation Management System will be able to more effectively manage transportation.

## **Project Location :**

Montgomery County, Maryland

## **Partner(s) :**

Montgomery County Office of Traffic, Montgomery County Transit, Maryland State Highway Administration, Orbital Sciences Corporation, Automatic Signal/Eagle Signal, RGA Inc.

## **Start Date:**

July 1994

## **End Date:**

September 1999

## **Estimated Total ITS Funds:**

\$1,060,000

## **Estimated Total Project Cost:**

\$1,860,000

## **Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667	
Tom Jacobs	FHWA Maryland Division, HB-MD	(410) 962-4342	Ext. 129
Emil Wolanin	Montgomery County	(301) 217-2208	



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## COLORADO I-25 TRUCK SAFETY IMPROVEMENTS

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**Description:**

This project is to fund the integration of ITS components in the Denver Metropolitan Area and along the interstates serving the greater Denver area. Included in the project will be the expansion and integration of the Colorado DOT and City of Colorado Springs traffic operations centers, and enhancements to incident management.

**Project Location :**

Colorado

**Partner(s) :**

Colorado DOT

**Start Date:**

October 1998

**End Date:**

September 2001

**Estimated Total  
ITS Funds:**

\$9,000,000

**Estimated Total  
Project Cost:**

\$11,250,000

**Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
John Nelson	Colorado DOT	(303) 512-5838	



## I-90/I-94 RURAL WISCONSIN ITS CORRIDOR

### **Description:**

The Wisconsin Department of Transportation (WisDOT) developed a strategic deployment plan for the Interstate 90/94 corridor in order to implement Intelligent Transportation Systems (ITS) technologies to improve the mobility, efficiency, productivity, and safety of travelers within the corridor. The corridor plan focuses on using ITS technologies in a rural environment and addresses unique rural problems and needs. This funding will enable ITS technology deployment and planning for the "West Salem" Weigh-in-Motion Scale, Automated Oversize/Overweight Routing, Variable Message Sign/Changeable Message Sign Operational Testing, and Incident Management.

### **Project Location :**

Interstate 90/94 Corridor, Wisconsin

### **Partner(s) :**

Wisconsin DOT

### **Start Date:**

October 1998

### **End Date:**

October 2000

### **Estimated Total ITS Funds:**

\$1,700,000

### **Estimated Total Project Cost:**

\$2,125,000

### **Contacts:**

John Berg	FHWA Wisconsin Division, HDA-WI	(608) 829-7515
Philip DeCabooter	Wisconsin State DOT	(608) 267-0452



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## MOBILE, ALABAMA FOG DETECTION SYSTEM

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**Description:**

This project will expand the fog detection and tunnel management system into a full incident management system on the seven-mile Bay Bridge and other segments of I - 10 through Mobile, Alabama.

**Project Location :**

Mobile, Alabama

**Partner(s) :**

Alabama DOT

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**Start Date:**

September 1996

**End Date:**

April 1999

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**Estimated Total  
ITS Funds:**

\$5,000,000

**Estimated Total  
Project Cost:**

\$6,500,000

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**Contacts:**

Bill Van Luchene

FHWA Alabama Division, HDA-AL

(334) 223-7379

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## ROCHESTER, NEW YORK CONGESTION MANAGEMENT

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**Description:** The purpose of this project is to provide integration of existing Road Weather Information System and highway maintenance functions with new traffic management and traveler information functions such as variable message signs and highway advisory radio.

**Project Location :** Rochester, New York

**Partner(s) :** New York State DOT

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**Start Date:** August 1997

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$1,500,000

**Estimated Total  
Project Cost:** \$3,912,000

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### Contacts:

Jerry Zell	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 228
Jim Will	New York State DOT	(716) 272-3450	





# SALT LAKE VALLEY ATMS SYSTEMS INTEGRATION

## **Description:**

This project will integrate the various physical components and develop other support systems for the Salt Lake Valley Advanced Traffic Management System (ATMS) operation, a fully functional system between the Utah DOT, Salt Lake City and Salt Lake County. The system integrator is responsible for the overall implementation and operation of all the various system components which are being deployed for the ATMS. The field equipment, communication facilities and control centers are being implemented by four different ATMS projects. The ATMS will provide integrated, multi-agency, multi-modal traffic management capabilities to support the safe and timely movement of people and goods in the region. The system will support network surveillance, surface street control, freeway control, HOV lane management, traffic information dissemination, regional traffic control, and incident management.

The system integrator will coordinate the work of this project with the efforts of the consultants and contractors for the other projects which are being implemented for the other portions of the ATMS. This will ensure operational compatibility among the various field elements, central control centers and corresponding elements. The project will implement a traffic signal system to provide central monitoring and control capabilities within the Salt Lake Area. The project will use the 2070 controller firmware to provide local processing of freeway detectors and ramp meter control. The Salt Lake County control center will use Georgia DOT software. Other activities to be completed as a part of this project include integrating ATMS with the DOT Public Safety dispatch system, develop real-time data exchange with Utah Transit Authority prototype signal priority project, develop a regional ITS Architecture, and enhance functionality of UDOT's winter maintenance by integrating RWIS with snowplow AVL and ATMS.

## **Project Location :**

Salt Lake Valley, Utah

## **Partner(s) :**

Utah DOT, Salt Lake City, Salt Lake County

## **Start Date:**

September 1997

## **End Date:**

December 2001

## **Estimated Total ITS Funds:**

\$8,500,000

## **Estimated Total Project Cost:**

\$10,625,000

## **Contacts:**

Martin Knopp	FHWA Utah Division, HPM-UT (2)	(801) 963-0078	Ext. 236
Dave Kinnecom	Utah DOT	(801) 965-4910	



# TUSCALOOSA, AL, TRAFFIC INTEGRATION AND FLOW CONTROL

## **Description:**

Tuscaloosa currently has an Advanced Traffic Management System that consists of a fiber-optic trunk line, an integrated multiple closed loop system and 8 CCTV cameras on major arterials. This system was developed using only local funds with a \$150,000 grant from AL DOT. This project will expand this system to include 20 additional CCTV cameras, extend the fiber-optic line, install non-freeway applications of variable message signs, expand the geographic information system to include traffic data and, via extended fiber-optic line, integrate the local Emergency Management System and include real-time traffic congestion data.

## **Project Location :**

Tuscaloosa, Alabama

## **Partner(s):**

Alabama DOT

## **Start Date:**

October 1998

## **End Date:**

December 2001

## **Estimated Total ITS Funds:**

\$2,200,000

## **Estimated Total Project Cost:**

\$2,750,000

## **Contacts:**

Bill Van Luchene	FHWA Alabama Division, HDA-AL	(334) 223-7379
Sonya Rice	Alabama DOT	(334) 242-6087



**Special Purpose**

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## TRANSLINK

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**Description:** This project will support the institution of a laboratory capability at the Texas Transportation Institute (TTI). The primary users of this laboratory facility will be Texas public agencies and private firms doing business in Texas. This institution is also a part of the ITS Research Centers of Excellence (RCE) program which has a mission to establish internationally recognized centers of excellence that provide long term ITS research solutions, promote ITS technologies and prepare ITS professionals to build and operate these intelligent transportation systems.

**Project Location :** College Station, Texas

**Partner(s):** Texas A & M University

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**Start Date:** October 1998

**End Date:** TBD

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**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$2,200,000

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### Contacts:

David Gibson

FHWA – TFHRC, HSR-10

(703) 285-2407

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# NASHVILLE, TENNESSEE TRAFFIC AND PARKING GUIDANCE SYSTEM

## **Description:**

This multiple phase comprehensive parking and traffic management system will utilize: traffic sensors, signals, electronic and static signs, communications devices, data processing hardware and software, and data display equipment. Implementation of this planned system will make parking facilities in Nashville easier to use and less disruptive for traffic both in the CBD and approaching routes into and out of the area.

## **Project Location :**

Nashville, TN

## **Partner(s) :**

Tennessee DOT and Nashville Dept. of Public Works

## **Start Date:**

August 1997

## **End Date:**

June 2000

## **Estimated Total ITS Funds:**

\$1,750,000

## **Estimated Total Project Cost:**

\$2,187,500

## **Contacts:**

Nathaniel Price	FHWA Tennessee Division, HDA-TN	(615) 781-5775
Mark Macy	Nashville Dept of Public Works	(615) 862-8760



## **Completed Projects**

# ADA COUNTY TRAVEL DEMAND MANAGEMENT EMISSIONS DETECTION

**Description:** The primary objective of this test was to evaluate the feasibility of using remote sensing technology to monitor vehicle emissions. Active infra-red roadside emissions detection technology was used to determine the relative contributions of in-county and out-of-county vehicles to mobile-source emissions.

**Project Location :** Ada County - Boise, Idaho

**Partner(s) :** Idaho DOT, Ada Planning Association, and Ada Air Quality Board

**Start Date:** August 1994

**End Date:** April 1996

**Estimated Total  
ITS Funds:** \$253,000

**Estimated Total  
Project Cost:** \$319,000

## Contacts:

Ross Blanchard	FHWA Idaho Division, HDA-ID	(208) 334-9180	Ext. 112
Erv Olen	Ada Planning Association	(208) 345-5374	



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## ADDITIONAL PROTOTYPE DEVELOPMENT (RT-TRACS)

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**Description:**

This study focused on the development of four additional real-time traffic adaptive signal control (RT-TRACS) prototypes which, together with the prototype developed under the ongoing RT-TRACS study, will be evaluated under a subsequent study.

**Project Location :**

See Contractors

**Contractor(s) :**

University of Minnesota, Miami Valley Research Institute, University of Maryland, and University of Arizona

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**Start Date:**

May 1994

**End Date:**

December 1996

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**Estimated Total  
ITS Funds:**

\$1,680,000

**Estimated Total  
Project Cost:**

\$1,680,000

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**Contacts:**

Deborah Curtis

FHWA - TFHRC, HSR-10

(703) 285-2542

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## ADVANCE

### **Description:**

ADVANCE (Advanced Driver and Vehicle Advisory Navigation Concept) was a cooperative effort to evaluate the performance of a large-scale in-vehicle navigation and dynamic route guidance system. Initially, 3,000 private, commercial and public agency vehicles in the northwestern suburbs of Chicago were scheduled to be equipped with in-vehicle navigation and dynamic route guidance systems. Early in FY 1995, the partnership became concerned with issues that surfaced involving development of the system and the status of the overall in-vehicle navigation and dynamic route guidance system market in this country. The issues were further refined and quantified and several deployment options were developed and evaluated. The Steering Committee at a meeting in late February 1995, unanimously approved the recommended targeted deployment option. A significant portion of the original project goals and objectives were met under targeted deployment. This option allowed for limited, specific testing of the in-vehicle navigation and dynamic route guidance system in a controlled environment at a significantly lower budget. Based on revised project goals and objectives, in-vehicle testing for the targeted deployment phase was completed in December 1995 using approximately 75 vehicles; 32 of these vehicles (project vehicles) were deployed for testing and evaluation. Eighty local households participated in a test of the system and their reactions were favorable. Vehicles served as probes, providing real-time traffic information to a Traffic Information Center (TIC). This information was processed and transmitted to the equipped vehicles and used to develop preferred routes. The routing information was presented to the driver in the form of dynamic routing instructions. An evaluation plan for ADVANCE based on targeted deployment was developed, adopted, and implemented. The evaluation was completed and the results were made available to the general public in January 1997. The Steering Committee also concurred in the further development and modification of the ADVANCE TIC (application phase of ADVANCE) so it can serve as the Corridor Transportation Information Center (C-TIC) for information dissemination efforts for the Gary-Chicago-Milwaukee (GCM) ITS Priority Corridor.

**Project Location :** Northwest suburbs of Chicago, Illinois

**Partner(s) :** Illinois DOT, Motorola Inc., Illinois Universities Transportation Research Consortium (IUTRC), American Automobile Association (AAA)

**Start Date:** July 1991

**End Date:** December 1996

**Estimated Total  
ITS Funds:** \$11,000,000

**Estimated Total  
Project Cost:** \$19,100,000



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**Contacts:**

Dave Helman	FHWA Headquarters, HTV-3	(202) 366-8042
Pete Olson	FHWA Illinois Division, HPP-IL	(217) 492-4634
Jeff Hochmuth	Illinois DOT	(847) 705-4800



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## ALTERNATE BUS ROUTING

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**Description:**

The Alternate Bus Route Project was a pilot evaluation of next generation Vehicle-to-Roadside Communications (VRC). The first phase utilized a VRC transponder as both an advanced read/write traffic probe and to advise a bus driver of traffic conditions between the Raritan Toll Plaza and Interchange 129 via visual and audio messaging.

**Project Location :**

Garden State Parkway, New Jersey

**Partner(s) :**

New Jersey DOT

**Start Date:**

August 1993

**End Date:**

May 1998

**Estimated Total  
ITS Funds:**

\$500,000

**Estimated Total  
Project Cost:**

\$1,027,253

**Contacts:**

Breck Jeffers	FHWA New Jersey Division	(609) 637-4231
Richard Rash	New Jersey Highway Authority	(908) 442-8600



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## ANN ARBOR SMART INTERMODAL

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**Description:**

This project supported the Ann Arbor Transportation Authority's (AATA) conduct of an operational test of the Smart Bus concept. Included are an on-board bus communication and navigation system, a central control system, and a "Smart Card" fare collection system. The on-board system monitors actual performance in regard to route, location, speed and status of mechanical systems. It allowed control of on-board electronics, such as the fare collection system, destination sign and enunciator. The on-board system also enables buses to interact with traffic signal preemption devices and to communicate with the central control system. The central control system integrates the data from the bus fleet for coordinated supervision, and also provides real-time transit information to the public. The "Smart Card" fare system provides a dual farecard/parking pass to encourage auto drivers to ride transit by providing them with an easy, cost-saving method for fare payment.

**Project Location :** Ann Arbor Transit Authority, Michigan

**Partner(s) :** City of Ann Arbor and University of Michigan

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**Start Date:** January 1994

**End Date:** November 1998

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**Estimated Total  
ITS Funds:** \$303,000

**Estimated Total  
Project Cost:** \$2,442,500

**Contacts:**

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366-6678
Bill Hiller	Ann Arbor Transportation Authority (AATA)	(313) 973-6500



## APTS TECHNOLOGY RESEARCH

### **Description:**

Under this project, various new technologies were evaluated for their potential benefit to transit, and studies were performed to support and facilitate the application of the technologies to public transportation. Studies performed addressed transit system architecture requirements, human factors issues, frequency spectrum requirements and allocations, multi-modal fare/toll payment smart cards, automatic vehicle monitoring and management system implementations, and map and spatial database requirements. This technical support included research and technical assistance to transit authorities implementing APTS technologies.

### **Project Location :**

Cambridge, Massachusetts

### **Contractor(s) :**

Volpe National Transportation Systems Center

### **Start Date:**

March 1995

### **End Date:**

October 1998

### **Estimated Total ITS Funds:**

\$585,000

### **Estimated Total Project Cost:**

\$585,000

### **Contacts:**

Ron Boenau	FTA TRI-11	(202) 366-0195
Robert S. Ow	Volpe National Transportation Systems Center	(617) 494-2411



## ATLANTA ATIS-KIOSK PROJECT

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### **Description:**

The Atlanta Traveler Information Kiosk project focuses on Traveler Information statewide. The project provides Traveler Information at a variety of locations including rest areas, welcome centers, shopping, employment, and lodging centers. The Kiosks are operated by Georgia Net, a Georgia state authority responsible for dissemination of various types of information. The evaluation for the project was led by Oak Ridge National Laboratory, along with the Georgia Institute of Technology, Clark-Atlanta University, and Concord Associates. A User Acceptance Test Report was produced by the evaluators. A network of 130 statewide deployed kiosks provide real-time traveler information including incident and congestion information, route planning, transit information, and more.

### **Project Location :**

Georgia, statewide with a concentration in the Atlanta Metropolitan Area

### **Partner(s) :**

Georgia DOT, Georgia Net, and other private sponsors

### **Start Date:**

March 1994

### **End Date:**

September 1997

### **Estimated Total ITS Funds:**

\$4,000,000

### **Estimated Total Project Cost:**

\$5,000,000

### **Contacts:**

Stephanie Kolb

FHWA Georgia Division, HDA-GA

(404) 562-3655

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## ATLANTA DRIVER ADVISORY SYSTEM (ADAS)

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**Description:**

The primary objective of this test was to evaluate the benefits of en-route traveler advisory and traveler services information using FM subcarrier wide area communications systems and applications of the 220 MHz frequency pairs. The evaluators of the field operational test produced a system performance test report for the project.

**Project Location :**

Atlanta, Georgia

**Partner(s) :**

Scientific-Atlanta, Federal Express, TRW, Concord Associates, Georgia Tech Research Institute, Georgia Tech., Clark Atlanta University, Georgia DOT, and Oak Ridge National Laboratory

**Start Date:**

March 1995

**End Date:**

September 1997

**Estimated Total  
ITS Funds:**

\$7,236,916

**Estimated Total  
Project Cost:**

\$8,557,116

**Contacts:**

Stephanie Kolb	FHWA Georgia Division, HDA-GA	(404) 562-3655
Karl Betz	Scientific Atlanta	(404) 903-2380



## ATLANTA TRAVELER INFORMATION SHOWCASE

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### **Description:**

The Atlanta Traveler Information System (TIS) project provides timely transportation information to travelers in the Atlanta metropolitan area through the use of Personal Communication Devices (PCDs), in-vehicle navigation devices, on-line computer information services, interactive television in selected hotels, and cable television. This information is available to both residents and visitors for trip planning purposes. The project was operational before, during, and after the 1996 Summer Olympic and Paralympic Games. The TIS includes information on multimodal travel options, including bus, rail and air travel. The TIS also includes an extensive public information campaign. The Showcase project successfully transferred all of the devices to the Georgia DOT for incorporation as legacy devices in the Statewide ITS. The Personal Communication Devices and the in-vehicle navigation devices are the only devices that are currently not being supported.

**Project Location :** Atlanta, Georgia

**Partner(s) :** Battelle, Georgia DOT, and MARTA

**Start Date:** February 1995

**End Date:** March 1997

**Estimated Total  
ITS Funds:** \$14,219,577

**Estimated Total  
Project Cost:** \$14,219,577

### **Contacts:**

Bob Rupert	FHWA Headquarters, HTV-3	(202) 366-2194
Stephanie Kolb	FHWA Georgia Division, HDA-GA	(404) 562-3655





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## ATMS RESEARCH ANALYSIS DATABASE SYSTEM

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**Description:**

The objective of this effort was to develop a means of integrating disparate traffic engineering tools through the use of a common data dictionary and database system. The set of software tools that could use this system include ATMS research software and traffic engineering analysis tools. This effort concentrated on developing the data dictionary, building a database designed around that dictionary, and modifying a small number of existing programs to use that database system.

The proposed system, the ATMS Research Analysis Database System (ATMS RADS), provides a standard data dictionary to be used for storage and retrieval of data used by ATMS and traffic engineering software. This project also uses a proof-of-concept development to demonstrate that this standard data dictionary and database system are useful to a variety of existing programs.

**Project Location :** Rome, New York

**Contractor(s) :** USAF Rome Laboratory

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**Start Date:** March 1997

**End Date:** October 1998

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**Estimated Total  
ITS Funds:** \$500,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Gene McHale

FHWA - TFHRC, HSR-10

(703) 285-2973

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## BALTIMORE-WASHINGTON CORRIDOR: SURVEILLANCE INFRASTRUCTURE IMPLEMENTATION

### **Description:**

The Baltimore Washington Corridor Surveillance Infrastructure Project consists of CCTV cameras, overhead mounted radar, and the communications required to take the equipment from the roadway to Maryland State Highway Administration's Statewide Operations Center to provide real-time traffic data. The overhead mounted radar is used for roadway speed monitoring and not for enforcement purposes. The infrastructure installation is on I-695, I-495, I-595, I-395, I-70, I-95, I-83, and I-270 in Maryland to provide MD State Highway Administration statewide operations center with real-time traffic data.

**Project Location :** Maryland

**Partner(s) :** Maryland State Highway Administration

**Start Date:** January 1993

**End Date:** February 1996

**Estimated Total  
ITS Funds:** \$2,200,000

**Estimated Total  
Project Cost:** \$2,750,000

### **Contacts:**

Tom Jacobs	FHWA Maryland Division HB-MD	(410) 962-4342	Ext. 129
Mike Zezeski	Maryland State Highway Administration	(410) 787-5859	



# BORMAN EXPRESSWAY ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS) PHASE I

## **Description:**

INDOT, in conjunction with Hughes Transportation Systems, JHK, and Avilla, developed and installed a functioning prototype Advanced Traffic Management System (ATMS) deploying several of the more promising electronic sensors and integrating them into the prototype using spread spectrum radio communications. The equipment was independently evaluated for dependability and cost effectiveness by Purdue University before being incorporated into the permanent ATMS that will be constructed in a later phase. The Borman ATMS has become an essential component of the Gary-Chicago-Milwaukee, Midwest ITS Priority Corridor.

## **Project Location :**

The Borman ATMS is a part of the Gary-Chicago-Milwaukee, Midwest ITS Priority Corridor

## **Partner(s) :**

Federal Highway Administration (FHWA), Indiana Department of Transportation (INDOT)

## **Start Date:**

July 1994

## **End Date:**

December 1996

## **Estimated Total ITS Funds:**

\$550,000

## **Estimated Total Project Cost:**

\$1,750,000

## **Contacts:**

Wendall Meyer	FHWA Indiana Division, HSP-IN	(317) 226-5234
Dan Shamo	Indiana DOT	(219) 362-6125



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## BOSTON SMARTRAVELER

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**Description:** The project tested the public acceptance and potential traffic impacts of a telephone-based audiotext traffic information service. An independent evaluation of the project was done and the final report is available. The project has moved beyond operational testing using other funds.

**Project Location :** Boston, Massachusetts

**Partner(s) :** Project contributors include the Massachusetts Highway Department, SmartRoute Systems. Several local radio and television stations donated advertising and promotion for the project

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**Start Date:** September 1992

**End Date:** December 1994

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**Estimated Total  
ITS Funds:** \$1,515,000

**Estimated Total  
Project Cost:** \$3,395,000

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### Contacts:

Edward Silva	FHWA Massachusetts Division	(617)494-2253
Michelle Boucher	Massachusetts Highway Department	(617)973-7315



## BUFFALO/NIAGARA FALLS ATMS

### **Description:**

This project provides for a variety of travel management enhancements to include: installation of a road weather information system and variable message signs; establishment of a weather advisory for a local bridge; an enhanced traffic operation center computer system; and freeway management capability in the Buffalo area. This was the first of several planned phases to establish a complete freeway management system in the Buffalo/Niagara Falls area.

### **Project Location :**

Buffalo, New York

### **Partner(s) :**

New York State DOT

### **Start Date:**

May 1995

### **End Date:**

March 1998

### **Estimated Total ITS Funds:**

\$2,000,000

### **Estimated Total Project Cost:**

\$2,791,286

### **Contacts:**

Jerry Zell	FHWA New York Division, HTS-NY	(518) 431-4125	Ext. 228
Dean Gustafson	New York State DOT	(716) 847-3669	



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## CALIFORNIA SMART TRAVELER

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**Description:**

This project was comprised of two components: (a) Los Angeles Smart Card, and (b) Orange County Smart Intermodal System. The Los Angeles Smart Card tested the use of smart cards for express transit services as well as for parking and other services at employment sites. Two different card technologies were tested: a contact card and a radio frequency (RF) proximity card. The Orange County Smart Intermodal System operationally tested (1) an integrated transit and traffic management system and (2) a real-time information system that included special event information.

**Project Location :**

Los Angeles and Orange County, California

**Partner(s) :**

Los Angeles Metropolitan Transportation Authority (LAMTA), Volpe National Transportation Systems Center, Aegis Transportation Information Systems, Inc., Merced County Council of Government, University of California, and California DOT (Caltrans)

**Start Date:**

September 1992

**End Date:**

December 1994

**Estimated Total  
ITS Funds:**

\$1,520,000

**Estimated Total  
Project Cost:**

\$3,290,000

**Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Cliff Loveland	CalTrans	(916) 654-9970



## CAPITAL: WASHINGTON, D.C. AREA OPERATIONAL TEST

### **Description:**

This ITS Operational Test made extensive use of the existing cellular infrastructure for both areawide surveillance and communications. Engineering Research Associates (ERA) equipment was collocated on Bell Atlantic Mobile towers to detect cellular usage and geolocate phones on designated roadways. Specific evaluation goals included determination of the accuracy of geolocation data; the accuracy and completeness of traffic information; the usefulness of passive statistical processing for measuring volume and incidents; the criteria for selecting roadways that can be monitored by these techniques; system capabilities; costs for deployment; public acceptance; and the usefulness of information dissemination to fleet vehicles.

### **Project Location :**

Washington, District of Columbia Metropolitan area

### **Partner(s) :**

Virginia DOT and Maryland State Highway Administration, Raytheon E Systems, Bell Atlantic NYNEX Mobile, and PB Farradyne

### **Start Date:**

August 1993

### **End Date:**

June 1997

### **Estimated Total ITS Funds:**

\$5,531,733

### **Estimated Total Project Cost:**

\$7,229,418

### **Contacts:**

Chung Eng	FHWA Headquarters, HTV-3	(202) 366-8043
Charles Hall	Virginia DOT	(804) 786-6777
Glenn McLaughlin	Maryland State Highway Administration	(410) 787-5872
Bob Ewald	Engineering Research Associates	(703) 208-1211



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## CHART STRATEGIC PLAN - MARYLAND

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**Description:**

This study developed a strategic plan for statewide deployment of ITS. CHART is Maryland's statewide transportation management program. This specific study developed a CHART strategic plan. Two areas that received emphasis are traffic management strategies and communications alternatives. The effort initially concentrated on congestion management in the Baltimore-Washington corridor. Both current and future needs were evaluated, including the application of ITS technologies and services. This project also provides for CHART systems integration using Congestion Mitigation Funds.

**Project Location :**

Maryland

**Partner(s) :**

Maryland State Highway Administration

**Start Date:**

December 1992

**End Date:**

May 1996

**Estimated Total  
ITS Funds:**

\$300,000

**Estimated Total  
Project Cost:**

\$2,245,000

**Contacts:**

Tom Jacobs	FHWA Maryland Division HB-MD	(410) 962-4342	Ext. 129
Mike Zezeski	Maryland State Highway Administration	(410) 787-5859	





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## CONNECTICUT FREEWAY ADVANCED TRAFFIC MANAGEMENT SYSTEMS (ATMS)

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**Description:** This ATMS project evaluated the use of roadside mounted radar detectors in combination with closed circuit television (CCTV) for incident detection and verification. The ATMS utilizes 44 radar detectors (wide- and narrow-beam) and compressed video.

**Project Location :** Hartford, Connecticut: I-91 and I-84 in the Hartford region

**Partner(s) :** Connecticut DOT

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**Start Date:** December 1991

**End Date:** December 1996

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**Estimated Total ITS Funds:** \$600,000

**Estimated Total Project Cost:** \$1,380,000

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### Contacts:

Bob Ramirez	FHWA Connecticut Division, HDA-CT	(860) 659-6703	Ext. 3004
James Mona	Connecticut DOT	(860) 594-3450	



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## DELAWARE COUNTY RIDETRACKING

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**Description:**

This project was developed and evaluated an automated identification and billing system (AIBS) for paratransit service. The AIBS automates existing processes using advanced technology for the identification of passengers, the accounting and billing data collected on each passenger trip, the reporting required for coordination with various transportation suppliers and internal performance monitoring. Elimination of manual processes, including eligibility verification and reconciliation of trip information for billing purposes, resulted in system efficiency and cost saving.

**Project Location :**

Delaware County, Pennsylvania

**Partner(s) :**

EG&G Dynatrend

**Start Date:**

September 1993

**End Date:**

July 1998

**Estimated Total  
ITS Funds:**

\$200,000

**Estimated Total  
Project Cost:**

\$200,000

**Contacts:**

Sean Ricketson

FTA Headquarters, TRI-11

(202) 366-6678

Judy McGrane

Community Transit

(610) 532-2900

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## DENVER, COLORADO RAPID TRANSIT DISTRICT (RTD) PASSENGER INFORMATION DISPLAY SYSTEM

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**Description:**

This project utilizes the data gathered from the Automatic Vehicle Locator (AVL) system, currently being installed on all RTD buses, to provide information to video monitors at selected locations throughout the District and at selected Ecopass companies regarding estimated bus departures for waiting bus passengers.

The memorandum of understanding between RTD-CDOT-Transportation Management Solutions-FHWA has been developed. The project was approved with limited funding as compared to the original proposal, therefore considerable negotiations have been necessary to clearly redefine the project.

**Project Location :**

Denver, Colorado

**Partner(s) :**

Colorado DOT, Transportation Management Solutions, and Denver RTD

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**Start Date:**

September 1993

**End Date:**

December 1998

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**Estimated Total  
ITS Funds:**

\$8,000,000

**Estimated Total  
Project Cost:**

\$10,500,000

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**Contacts:**

W. Raymond Keng

FTA Headquarters, TRI-11

(202) 366-6667

Dave Shelley

Denver Rapid Transit

(303) 299-2408

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## DETECTION TECHNOLOGY FOR ITS

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**Description:**

This contract developed functional and performance specifications for permanently deployed and portable vehicle detectors in ITS applications. Candidate vehicle detector technologies were evaluated through laboratory and field testing of currently available state-of-the-art detectors. Such detectors include ultrasonic, infrared, microwave radar, video image processors, magnetometers, and inductive loops. In some instances, commercially available detectors did not meet ITS specifications. In these cases, functional requirements were developed for the detectors. Another part of the study dealt with determining if a permanent national vehicle detector test facility is needed to provide vehicle detector test data for future commercial vehicle detectors used in ITS. The executive summary for this project can be found on the internet at [www.tfhr.gov](http://www.tfhr.gov).

**Project Location :** Fullerton, California

**Contractor(s) :** Hughes Ground Systems Group

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**Start Date:** September 1991

**End Date:** September 1996

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**Estimated Total  
ITS Funds:** \$1,777,000

**Estimated Total  
Project Cost:** \$1,777,000

**Contacts:**

Milton K. Mills

FHWA - TFHRC, HSR-2

(703) 285-2402



## DETROIT, MICHIGAN AREAWIDE DEPLOYMENT OF ATMS/ATIS

### **Description:**

The Michigan DOT has recently completed a comprehensive ATMS/ATIS Early Deployment Plan for expansion of the existing 32.5 miles of instrumented freeway coverage to 250 miles in Metropolitan Detroit. The deployment undertaken in Phase One has expanded the system coverage by 150 miles, and provides the Michigan Intelligent Transportation Systems (MITS) Center in Detroit with the capability to monitor traffic and congestion through the use of mainline traffic detectors (loops and machine vision), ramp metering and video surveillance. Traveler information is provided via highway advisory radios and changeable message signs. The implementation of the ATMS/ATIS system provides the Michigan DOT the means to detect and verify incidents on selected corridors in a timely manner, to provide traffic operations personnel sufficient data to respond to incidents and to disseminate traffic and congestion information to motorists so they can plan or modify their travel plans. Additionally, the system has the capability to manage mainline work zones, calculate mainline volume demand and predict traffic flow patterns for special events, planned work/constructions zones, and other special events. The corridors being deployed include selected segments of Interstates 75, 94, 96 and 696, and the M-10 and M-39 freeways.

**Project Location :** Detroit, Michigan metropolitan area

**Partner(s) :** Michigan DOT, Road Commission for Oakland County

**Start Date:** June 1994

**End Date:** October 1998

**Estimated Total  
ITS Funds:** \$3,000,000

**Estimated Total  
Project Cost:** \$33,389,353

### **Contacts:**

Morrie Hoewel	FHWA Michigan Division	(517) 377-1880	Ext. 32
Dr. Kunwar Rajendra	Michigan DOT	(517) 373-2247	



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## DETROIT TRANSPORTATION CENTER TRANSIT INFORMATION

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**Description:**

This was a joint FTA/FHWA project that provided real-time traffic condition information to dispatch centers of public transit agencies in the Detroit area. MDOT's Detroit Freeway Operations Center collected traffic information on 32 miles of freeway through a buried inductive loop system. The information was then graphically displayed on computer monitors by color coding individual freeway segment (link) speeds. This project demonstrated the ability to provide the information to public and private transit operators inexpensively, and then monitored performance changes and evaluated the results.

**Project Location :** Detroit, Michigan

**Partner(s) :** City of Detroit and Michigan DOT

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**Start Date:** December 1993

**End Date:** April 1995

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**Estimated Total  
ITS Funds:** \$50,000

**Estimated Total  
Project Cost:** \$100,000

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**Contacts:**

Sean Ricketson

FTA Headquarters, TRI-11

(202) 366-6678

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## EVALUATING ENVIRONMENTAL IMPACTS OF ITS USING LIDAR

### **Description:**

This test combined Light Detection and Ranging (LIDAR) technology for wide area emissions detection with active infrared technology for roadside emissions detection to evaluate changes in air quality due to implementing traffic responsive control strategies for events at a sports complex. The objectives were to: (1) measure the effect of MnDOT's Portable Traffic Management System on air quality, (2) determine the ability of LIDAR technology to provide quantitative and qualitative air quality data, and (3) assess the overall effectiveness of LIDAR as an evaluation tool.

### **Project Location :**

Minneapolis and St. Paul, Minnesota

### **Partner(s) :**

Minnesota DOT, Santa Fe Technologies, Loral Federal Systems, and University of Minnesota

### **Start Date:**

July 1994

### **End Date:**

June 1997

### **Estimated Total ITS Funds:**

\$500,000

### **Estimated Total Project Cost:**

\$766,847

### **Contacts:**

Jim McCarthy	FHWA Minnesota Division, HDA-MN	(612) 291-6112
Marthand Nookala	Minnesota DOT	(612) 296-8567



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## EVALUATION OF REAL-TIME TRAFFIC ADAPTIVE SIGNAL CONTROL PROTOTYPES

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**Description:**

This study focused on the evaluation of five real-time traffic adaptive signal control prototypes previously developed. The evaluation consisted of three phases: conceptual evaluation, laboratory evaluation, and field evaluation. The conceptual evaluation established the validity of the prototypes' overall concept. The laboratory evaluation tested each prototype in a simulated environment against an optimal baseline case study. Various scenarios were evaluated including a high type arterial, a small grid network, a complex grid network, and a cluster network. The field evaluation implemented and evaluated a promising prototype strategy within the overall Real Time-Traffic Adaptive Control System.

**Project Location :** Colorado Springs, Colorado

**Contractor(s) :** ITT Systems

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**Start Date:** January 1995

**End Date:** December 1998

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**Estimated Total  
ITS Funds:** \$1,796,400

**Estimated Total  
Project Cost:** \$1,796,400

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**Contacts:**

Deborah Curtis

FHWA - TFHRC, HSR-10

(703) 285-2542





## FM/SCA PROTOTYPE FOR TRAFFIC INFORMATION BROADCAST

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### **Description:**

This project involved the test and evaluation by an industry organization of the prototype Subsidiary Communications Authorization (SCA) Traffic Information Channel (STIC) waveform. A system based on this waveform will allow a commercial FM broadcast station's subcarrier to transmit traffic and other data at rates higher than previously achieved. The data rate for this system will be high enough to support broadcast of individual link travel times (e.g., for routing applications). The completed prototype transmission and reception scheme will be tested using mostly off-the-shelf equipment in several diverse areas to assess concept feasibility. The equipment, developed by Mitretek Systems, under contract to FHWA over the last several years, was built to meet the specific requirements of ITS, but has application for other data broadcast scenarios.

**Project Location :** Washington, DC

**Contractor(s) :** Electronic Industries Association

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**Start Date:** September 1993

**End Date:** December 1997

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**Estimated Total  
ITS Funds:** \$50,000

**Estimated Total  
Project Cost:** \$50,000

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### **Contacts:**

James Arnold

FHWA - TFHRC, HSR-10

(703) 285-2974

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## FUEL CONSUMPTION AND EMISSION VALUES FOR TRAFFIC MODELS

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**Description:**

The Oak Ridge National Laboratory (ORNL) developed a database of on-road fuel consumption and emissions for eight late model vehicles, as a function of vehicle speed and acceleration. These vehicle "maps" were developed for use in simulation models that evaluate strategies to enhance roadway design, traffic control, and ITS concepts. The maps permit simulation models to calculate the energy and emission impacts of highway traffic improvements.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Oak Ridge National Laboratory

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**Start Date:** June 1993

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$1,300,000

**Estimated Total  
Project Cost:** \$1,300,000

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**Contacts:**

Aladdin Barkawi

FHWA - TFHRC, HSR-10

(703) 285-2093

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## GENESIS

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**Description:**

Genesis is an advanced traveler information system (ATIS) that uses personal communications devices (PCDs) to distribute information. Timely delivery means gathering the data in real-time and distributing the data to travelers when they need it, where they need it and how they need it. Genesis is an element in the Minnesota Guidestar ITS program. With transit and traffic data, Genesis is able to provide the urban traveler with current data relevant to a chosen trip mode and route. The Genesis PCD is portable and transit information is fully accessible to the user.

**Project Location :**

Minneapolis/St. Paul, Minnesota

**Partner(s) :**

Minnesota DOT, Motorola Center for Transportation Studies, University of Minnesota

**Start Date:**

September 1992

**End Date:**

October 1997

**Estimated Total  
ITS Funds:**

\$4,069,000

**Estimated Total  
Project Cost:**

\$5,666,000

**Contacts:**

Jim McCarthy	FHWA Minnesota Division, HDA-MN	(612)291-6112
Ray Starr	Minnesota DOT	(612)582-1459



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## GIS APPLICATIONS AND TECHNICAL SUPPORT

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**Description:** This project developed Geographic Information System (GIS) applications and provided technical support for implementation of the National Transit GIS. Coding was provided for fixed guideway facilities including heavy rail, light rail and people movers. Equipment has been purchased in this project to accomplish the work. Outreach activities included information booth displays and brochures.

**Project Location :** Cambridge, Massachusetts

**Contractor(s) :** Volpe National Transportation Systems Center

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**Start Date:** March 1995

**End Date:** December 1995

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**Estimated Total  
ITS Funds:** \$600,000

**Estimated Total  
Project Cost:** \$600,000

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### Contacts:

William Wiggins

FTA Headquarters, TRI-11

(202) 366-0915

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## GOLDEN GLADES INTERCHANGE

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**Description:**

This project resulted in the deployment of advanced traffic management technologies. The State of Florida installed advanced traffic management technologies at the Golden Glades Interchange on Interstate 95 in Dade County, Florida. Real-time monitoring and rapid verification of incidents was provided with closed circuit television (CCTV), and variable message signs (VMS) provide motorist information for this section of the freeway network.

**Project Location :**

Dade County, Florida

**Partner(s) :**

Florida DOT

**Start Date:**

July 1992

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$3,300,000

**Estimated Total  
Project Cost:**

\$4,125,000

**Contacts:**

Maisar Khaled	FHWA Florida Division, HDA-FL	(850) 942-9596
Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693



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## INCIDENT DETECTION ISSUES - PART I : FREEWAYS

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**Description:**

The "Incident Detection Issues - Part I (Freeways)" project developed a support system in three modular parts. The first part developed malfunction management techniques to help provide useful data under conditions of detector component failure. The second part developed algorithms to take the information and develop a "current status" of the network. The third part developed algorithms that will detect an incident when there are significant discrepancies in the predicted/expected overall network operating status.

**Project Location :**

San Luis Obispo, California

**Contractor(s) :**

VERAC; BALL Systems

**Start Date:**

April 1993

**End Date:**

September 1997

**Estimated Total  
ITS Funds:**

\$1,923,000

**Estimated Total  
Project Cost:**

\$1,923,000

**Contacts:**

Aladdin Barkawi

FHWA - TFHRC, HSR-10

(703) 285-2093

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## INTELLIGENT CORRIDOR SYSTEM

### **Description:**

The Southeast Florida Intelligent Corridor System (ICS) integrates the elements of Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Advanced Public Transportation Systems (APTS), Commercial Vehicle Operations (CVO), and Advanced Vehicle Control and Safety Systems (AVCSS). The extensive intermodal aspects of the I-95 corridor within Palm Beach, Broward, and Dade Counties are a priority in the development of the ICS. Initial early implementation activities were centered around the ATMS function. Park-and-Ride lots, High Occupancy Vehicle (HOV) lanes, commuter rail, heavy rail, bus, and connections to airport cruise port, and seaport facilities are all present in the corridor. The overall goal of the project is to provide real-time information to assist I-95 corridor travelers with guidance and mode decisions prior to and during a trip. Phase I of the project (completed in December 1994) provided a design report and a preliminary engineering and operational analysis. Phase II has performed the final design to deploy ITS technologies to provide real-time intermodal information on the I-95 corridor.

**Project Location :** Miami - Ft.Lauderdale, Florida

**Partner(s) :** Federal Highway Administration (FHWA), Florida DOT

**Start Date:** July 1992

**End Date:** May 1998

**Estimated Total  
ITS Funds:** \$6,180,000

**Estimated Total  
Project Cost:** \$7,725,000

### **Contacts:**

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693
Maisar Khaled	FHWA Florida Division, HDA-FL	(850) 942-9596
Rory Santana	Florida DOT	(305) 470-5335



## ITS FOR VOLUNTARY EMISSIONS REDUCTION

### **Description:**

An active infrared roadside emissions sensor and a variable message sign at a freeway exit ramp provided real-time vehicle emissions readings to passing motorists. A telephone information hotline, and brochures were made available at area service stations provided motorists additional information on the benefits of keeping their vehicle tuned. The focus of this project was to prompt people to tune their vehicles to reduce emissions. The effectiveness of the test was evaluated through surveys and by measurement of identified high emitters at the site over time. The primary objective of this test was to evaluate the usefulness and public acceptance of providing real-time emissions information to drivers and education material about the fuel savings and air quality benefits of well tuned vehicles.

### **Project Location :**

Denver, Colorado

### **Partner(s) :**

Colorado DOT, University of Denver, Remote Sensing Technologies Inc., Conoco Inc., Skyline Products Inc.

### **Start Date:**

September 1994

### **End Date:**

August 1997

### **Estimated Total ITS Funds:**

\$304,663

### **Estimated Total Project Cost:**

\$498,358

### **Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
John Kiljan	Colorado DOT	(303) 512-5858	





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## ITS MODELS AND SIMULATION SYSTEMS PROGRAM

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**Description:**

This activity modified existing traffic models to simulate ITS operations such as real-time control strategies, route guidance capabilities, real-time graphics displays, environmental and safety measures of effectiveness, effects of in-vehicle navigation systems, probe vehicle/path selection capabilities, and user interfaces. As a minor effort, this activity also examined the feasibility and applicability of incorporating advanced analytic techniques (such as image processing, neural networks, parallel processing, control theory, and real-time distributed systems) into the models.

**Project Location :**

Colorado Springs, Colorado

**Contractor(s) :**

ITT Systems

**Start Date:**

September 1995

**End Date:**

April 1998

**Estimated Total  
ITS Funds:**

\$2,969,872

**Estimated Total  
Project Cost:**

\$3,169,796

**Contacts:**

Raj Ghaman

FHWA - TFHRC, HSR-10

(703) 285-2408

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## JOHNSON CITY, TN

### **Description:**

Phase I of the Johnson City Med/Tech Corridor ITS Project uses advanced computer and communications technology to more effectively manage parking and travel within a city dominated by an institutional corridor. Phase II of the Johnson City ITS Project expanded upon the parking management technologies tested in Phase I to develop a broadly-deployed ITS system incorporating automated traffic signal control technologies, Advanced Transit Management Systems, and dissemination of transportation information via the Internet. The technologies used for travel management are designed to conform to the national ITS architecture for modular addition of ITS services. Specific objectives to be achieved in Phase II included: use of GIS to support interactive control of Johnson City MONARC traffic signal control system and to optimize traffic signal timing for real-time response to traffic loads; specify, design, and install Automatic Vehicle Location System, computer-aided dispatch, and automated paratransit scheduling to optimize transit and paratransit operations; develop an Internet site for public access for ATIS and for public participation in the transportation planning process; and promote public awareness and use of ITS products.

**Project Location :** Johnson City, Tennessee

**Partner(s) :** Tennessee DOT, City of Johnson City, and Raytheon (Phase I)

**Start Date:** July 1994

**End Date:** January 1998

**Estimated Total  
ITS Funds:** \$3,730,000

**Estimated Total  
Project Cost:** \$4,662,500

### **Contacts:**

Nathaniel Price	FHWA Tennessee Division, HPR-TN	(615) 781-5775
Tom Hiltner	City of Johnson City	(423) 434-6271



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## KANSAS CITY - INTELLIGENT TRANSPORTATION SYSTEM DEPLOYMENT

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**Description:** This project implemented Phase I of the Kansas City ITS Strategic Deployment Plan which includes a freeway incident management system along 77 kilometers of Interstate highways in both Missouri and Kansas.

**Project Location :** Kansas City Metropolitan Area

**Partner(s) :** Kansas DOT, Missouri DOT

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**Start Date:** July 1998

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$2,500,000

**Estimated Total  
Project Cost:** \$3,125,000

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### Contacts:

Bob Thomas	FHWA Missouri Division, HDA-MO	(573) 636-7104
Sabin Yanez	Missouri DOT	(816) 889-6450
Matt Volz	Kansas DOT	(413) 296-6356



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## MOBILE COMMUNICATIONS SYSTEM

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**Description:**

This project tested and evaluated the use of a portable detection and surveillance system for highway construction, special events, and incident locations. Specially-equipped trailers were placed at temporary traffic congestion locations throughout Orange County. Trailer-mounted video image detectors used spread spectrum radio for transmission of real-time information to a CalTrans control center.

**Project Location :**

Orange County, California

**Partner(s) :**

California DOT (CalTrans), City of Anaheim, City of Irvine, Hughes Aircraft, CalPoly University, PATH, California Highway Patrol, Orange County Transportation Authority, and the University of California – Irvine's Institute of Transportation Studies

**Start Date:**

May 1994

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$2,459,432

**Estimated Total  
Project Cost:**

\$3,679,690

**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
John Thai	City of Anaheim	(714) 765-5183



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## MONTGOMERY ADVANCED TRAFFIC MANAGEMENT SYSTEM

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**Description:** Development of an Advanced Traffic Management System for the City of Montgomery. It will include the installation of 12 miles of fiber optic cable along the southern and eastern by-passes that will inter-connect all traffic signals along that corridor. It will also install cameras at major intersections.

**Project Location :** Montgomery, Alabama

**Partner(s) :** City of Montgomery/Alabama DOT/FHWA

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**Start Date:** August 1997

**End Date:** December 1998

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**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$1,000,000

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### Contacts:

Bill Van Luchene

FHWA Alabama Division, HDA-AL

(334) 223-7379

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# MULTI-JURISDICTIONAL LIVE AERIAL VIDEO SURVEILLANCE SYSTEM, I

## **Description:**

This ITS operational test project provided for the procurement, installation, and evaluation of live video transmission from a gyro-stabilized camera mounted on helicopters for use in observing, evaluating, and properly managing major highway incidents and situations of a public safety nature. The live color video was transmitted to police and state highway traffic management centers, and to mobile command centers at incident sites. Communications technologies included microwave, Community Access TV (CATV), and state-owned coaxial cable. It was found that the use of real-time airborne video serves as a valuable component of an Advanced Traffic Management System (ATMS), particularly in major incident management.

**Project Location :** Fairfax County, Virginia

**Partner(s) :** Fairfax County Police, Virginia State Police, and Virginia DOT

**Start Date:** September 1991

**End Date:** July 1995

**Estimated Total ITS Funds:** \$355,000

**Estimated Total Project Cost:** \$355,000

## **Contacts:**

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
Jim Chu	Virginia DOT	(703) 383-2600
CPT. Bob Fitzpatrick	Fairfax County Police	(703) 556-7750



# MULTI-JURISDICTIONAL LIVE AERIAL VIDEO SURVEILLANCE SYSTEM, II

## **Description:**

Similar in concept to the completed project in Fairfax County, Virginia, this operational test project evaluated live video transmission from fixed-wing aircraft to county and state traffic management centers. Maryland and Virginia cooperated in this effort and transmitted video to traffic management centers in both states. Maryland, like Virginia, also tested the feasibility of transmitting live video to mobile command centers. The project was recently amended to include establishment of a data and video link between the Montgomery County ATMS and the ITS Room located at US DOT Headquarters in Washington, DC.

## **Project Location :**

Montgomery Country, Maryland

## **Partner(s) :**

Montgomery County Office of Traffic and Maryland State Highway Administration

## **Start Date:**

September 1991

## **End Date:**

June 1997

## **Estimated Total ITS Funds:**

\$645,000

## **Estimated Total Project Cost:**

\$645,000

## **Contacts:**

Tom Jacobs	FHWA Maryland Division, HB-MD	(410) 962-4342	Ext. 129
Mike Zezeski	Maryland State Highway Administration	(410) 787-5859	
Emil Wolanin	Montgomery County	(301) 217-2208	



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## NETWORK-WIDE OPTIMIZATION OF MODELS

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**Description:**

The objective of this contract was to develop a computer package which will allow users to: (1) coordinate the signal timing and ramp metering functions, (2) develop metering rates for metered freeway on-ramps, and (3) optimize signal timing at isolated intersections, on arterials, and in closed networks. In addition, a Windows-based user interface based on a graphical user interface utilizing point-and-click technology was developed for this package.

**Project Location :**

Rockville, Maryland

**Contractor(s) :**

PB Farradyne, Inc.

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**Start Date:**

November 1992

**End Date:**

May 1998

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**Estimated Total  
ITS Funds:**

\$1,655,000

**Estimated Total  
Project Cost:**

\$1,655,000

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**Contacts:**

Deborah Curtis

FHWA - TFHRC, HSR-10

(703) 285-2542

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## NEW JERSEY SIGNAL COMPUTERIZATION

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**Description:** A coordinated computerized signal system on Route 18, Route 73, and Route 1, was deployed utilizing advanced traffic control software and video surveillance.

**Project Location :** New Jersey

**Partner(s) :** New Jersey DOT

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**Start Date:** January 1992

**End Date:** December 1998

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**Estimated Total  
ITS Funds:** \$13,000,000

**Estimated Total  
Project Cost:** \$39,000,000

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### Contacts:

Dave Powell	FHWA New Jersey Division, DET-NJ	(609) 637-4207
Roy Gustavason	New Jersey DOT	(609) 530-2604



# NEW YORK THRUWAY ELECTRONIC TOLL COLLECTION AND TRAFFIC MANAGEMENT

## **Description:**

As part of the E-Z-PASS Interagency Group (a coalition of seven toll authorities in New York, New Jersey, Delaware, and Pennsylvania), the New York State Thruway Authority (NYSTA) is deploying Electronic Toll Collection and Traffic Management (ETTM) on its facilities. NYSTA's aggressive ETTM program resulted in applying the Automatic Vehicle Identification (AVI) technology to the 63 toll plazas of the Thruway's 641-mile system by the end of 1996. The proposed distributed system accommodates both commercial vehicles and commuter traffic with read-write technology. The NYSTA is also creating a multi-agency automated billing system for seamless customer service on other E-Z PASS systems.

**Project Location :** New York Thruway

**Partner(s) :** New York Thruway Authority

**Start Date:** April 1994

**End Date:** September 1998

**Estimated Total  
ITS Funds:** \$14,650,000

**Estimated Total  
Project Cost:** \$35,850,000

## **Contacts:**

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Barry Solomon	New York State Thruway Authority	(518) 471-4352	



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## NORFOLK MOBILITY MANAGER

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**Description:**

This project operationally tested and evaluated how transit and paratransit user subsidies can improved transportation services available to low-income transit riders. Subsidies provided directly to low-income people encouraged private operators to provide better transportation services. Part of the project allowed Tidewater Regional Transit (TRT) to act as a mobility manager through its distribution of "Mobility Vouchers" to employers who, first, contribute to the face value of the vouchers and then, gave them to qualified employees as a benefit. Employees used the vouchers to pay for the transit service of their choice. In addition to working through employers, the project included an effort to work with social service agencies, especially in the medical area.

**Project Location :**

Norfolk, Virginia

**Partner(s) :**

Tidewater Transportation District Commission

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**Start Date:**

April 1989

**End Date:**

December 1993

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**Estimated Total  
ITS Funds:**

\$500,000

**Estimated Total  
Project Cost:**

\$600,000

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**Contacts:**

Ron Boenau

FTA Headquarters, TRI-11

(202) 366-0195

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## PORTLAND SMART BUS

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**Description:**

This project reviewed the German-made Flexible Operation Command and Control System (FOCCS) that integrates fixed-route transit, dial-a-ride minibus, and contract taxi services. The information integration provides arrival and destination data to travelers and operators. The review included the following: first, evaluating the technical and economic feasibility of adding audiotex/videotex components and carpool matching capabilities to the systems; second, evaluating the technical requirements of adding a FOCCS components to Tri-Met's central control plans; third, evaluating the cost-effectiveness of FOCCS in Portland's rapidly growing suburbs; and fourth, designing an operational test for those components found suitable. Hardware and software requirements are included in the analysis.

**Project Location :** Portland, Oregon

**Contractor(s) :** Tri-Met of Portland, Oregon

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**Start Date:** September 1990

**End Date:** September 1993

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**Estimated Total  
ITS Funds:** \$54,000

**Estimated Total  
Project Cost:** \$90,000

**Contacts:**


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Ron Boenau

FTA Headquarters, TRI-11

(202) 366-0195

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## RAILROAD CROSSING VEHICLE PROXIMITY ALERT SYSTEM

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**Description:**

The Vehicle Proximity Alert System (VPAS) is designed to warn drivers of priority vehicles (emergency vehicles, school buses, hazardous material haulers) about the presence of approaching trains at highway-rail grade crossings. This alert is activated via an in-vehicle warning (audio/visual). Testing and evaluation of several selected prototype systems for system performance and reliability have been completed. This was accomplished at the Transportation Technology Center (TTC) test track facilities in Colorado. No further testing is required on these prototype systems and an evaluation report will be published in 1999.

**Project Location :**

Phase I: Pueblo, Colorado; Phase II - Testing: TBD

**Partner(s) :**

Smart Stops Unlimited., Inc., E.A.R.S., Dynamic Vehicle Safety Systems and the Federal Railroad Administration

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**Start Date:**

June 1995

**End Date:**

December 1998

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**Estimated Total  
ITS Funds:**

\$1,000,000

**Estimated Total  
Project Cost:**

\$1,000,000

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**Contacts:**

James Smailes

FRA Headquarters, RDV-11

(202) 493-6360

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## REAL-TIME TRAFFIC ADAPTIVE SIGNAL CONTROL FOR ITS

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**Description:**

This study, to develop a prototype real-time, traffic adaptive signal control system suitable for use in an ITS environment by 1997, is the first of three studies which will eventually develop five prototypes for laboratory evaluation, from which one was selected for further development and field evaluation by 1997. This study encompasses the first stage of a long term effort. A single, major contract was awarded to a consortium composed of State and local DOT's, private industry, and academia.

**Project Location :** Rockville, Maryland

**Contractor(s) :** PB Farradyne, Inc.

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**Start Date:** June 1992

**End Date:** June 1998

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**Estimated Total  
ITS Funds:** \$4,832,537

**Estimated Total  
Project Cost:** \$4,832,537

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**Contacts:**

Deborah Curtis

FHWA - TFHRC, HSR-10

(703) 285-2542

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## SACRAMENTO RIDESHARE

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**Description:** The Sacramento Real-Time Ridesharing project used a geographic information system (GIS) to provide single-trip or multiple-trip real-time ridesharing information. A driver seeking a rider entered the request into the system through one of the transportation management associations (TMAs). A prospective rider entered a destination and ride request. Driver incentives were also identified in the implementation of the system.

**Project Location :** Sacramento, California

**Partner(s) :** Division of New Technology and Research of the California DOT (Caltrans), Sacramento Rideshare, Transportation Management Associations (TMA), Sacramento Council of Governments, and Volpe National Transportation Systems Center

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**Start Date:** January 1993

**End Date:** December 1995

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**Estimated Total  
ITS Funds:** \$204,000

**Estimated Total  
Project Cost:** \$825,000

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### Contacts:

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Cliff Loveland	CalTrans	(916) 654-9970



## SALT LAKE CITY INTERIM TRAFFIC OPERATIONS CENTER

### **Description:**

This project consisted of the development of an interim Traffic Operations Center (TOC) located at the site where the planned Salt Lake City Traffic Control Center will ultimately be located. The interim TOC supports the operation of the Utah DOT, Salt Lake County and Salt Lake City signal systems and the freeway management system to facilitate travel during the reconstruction of I-15 in the Salt Lake City area. The I-15 reconstruction project includes installation of the ultimate Utah DOT freeway management system for the area.

### **Project Location :**

Salt Lake City, Utah

### **Partner(s) :**

Utah DOT, Salt Lake City, Salt Lake County

### **Start Date:**

October 1997

### **End Date:**

December 1998

### **Estimated Total ITS Funds:**

\$1,500,000

### **Estimated Total Project Cost:**

\$1,875,000

### **Contacts:**

Martin Knopp	FHWA Utah Division, HPM-UT1	(801) 963-0078	Ext. 236
Dave Kinnecom	Utah DOT	(801) 965-4910	





## SAN ANTONIO TRANSGUIDE

### **Description:**

The Texas DOT installed a state-of-the-technology advanced traffic management system (TransGuide) in San Antonio. The Phase 1 project resulted in a three story control center and twenty-five miles of the one hundred ninety mile proposed ATMS. TransGuide provides:

- \* Complete digital communication network (voice, data, and video);
- \* Communication standard "SONET";
- \* Fully redundant fiber optic network;
- \* Fault tolerant computer system;
- \* Software developed to "POSIX" standards;
- \* Fully developed Central Control facility with a test-bed development computer;
- \* Field equipment consisting of changeable message signs, lane control signals, loop detectors, and surveillance cameras;
- \* Incident detection goal of 2 minutes; and
- \* System response goal of under 1 minute after detection.

This Operational Test documented the San Antonio TransGuide system design rationale and goals, evaluate the system's success in meeting the design goals, and evaluate the digital communication network for cost effectiveness and benefits versus "traditional" transportation data communication systems. An additional element of this Operational Test is the on-line evaluation and comparison of several incident detection algorithms.

A \$150,000 Before-and-After study for Phase 2 on Loop 410 was added to the project in 1996, extending the completion date for a year.

**Project Location :** San Antonio, Texas

**Partner(s) :** Texas DOT, AlliedSignal Technical Services Corporation, Southwest Research Institute (SWRI), and Texas Transportation Institute (TTI)

**Start Date:** August 1993

**End Date:** March 1998

**Estimated Total  
ITS Funds:** \$1,049,654

**Estimated Total  
Project Cost:** \$1,485,966



**Contacts:**

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Pat Irwin	Texas DOT	(210) 731-5249
Gene Schroeder	Texas DOT - TRF (Austin)	(512) 416-3309



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## SANTA CLARA COUNTY SMART VEHICLE

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**Description:**

This project used global positioning system (GPS) technology for automatic vehicle location (AVL) operation of a paratransit system in conjunction with bus, light rail, and train operation. The service provided allows disabled travelers to request specific transportation service. A vehicle was routed and, where appropriate, the traveler was transferred to a fixed-route mode. Use is made of AVL technology, demand-responsive dispatching software, and a navigable map database which allows the closest available vehicle nearest a requester to be dispatched.

**Project Location :**

Santa Clara County, California

**Partner(s) :**

Division of New Technology and Research of the California DOT (Caltrans), Santa Clara County Transportation Authority, Outreach Paratransit Broker, Trimble Navigation, UMA Engineering, Navigation Technologies, and Volpe National Transportation Systems Center

**Start Date:**

November 1993

**End Date:**

October 1995

**Estimated Total  
ITS Funds:**

\$425,000

**Estimated Total  
Project Cost:**

\$850,000

**Contacts:**

W. Raymond Keng	FTA Headquarters, TRI-11	(202) 366-6667
Cliff Loveland	CalTrans	(916) 654-9970



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## SATELLITE COMMUNICATIONS FEASIBILITY

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**Description:**

This project evaluated the use of Very Small Aperture Terminal (VSAT) satellite as the communications medium for four stationary closed-circuit television (CCTV) cameras and a mobile CCTV camera and communication platform. Specific objectives of the project are to: (1) develop and evaluate the feasibility of remote switching of multiple cameras through a single satellite channel, (2) develop and evaluate the feasibility of a mobile CCTV camera and communication platform, (3) determine the impact of weather conditions and other factors that degrade the VSAT signal integrity, (4) determine the limitation of VSAT for video surveillance by examining image clarity, pan-tilt-zoom controls and other factors associated with day-to-day CCTV freeway surveillance, (5) test the security of VSAT remote equipment with respect to vandalism and theft, and (6) compare VSAT video quality with other communications medium including leased T-1 service and direct fiber optic cable.

**Project Location :** I-95 in Philadelphia, Pennsylvania

**Partner(s) :** Pennsylvania DOT

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**Start Date:** October 1992

**End Date:** October 1998

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**Estimated Total  
ITS Funds:** \$2,200,000

**Estimated Total  
Project Cost:** \$2,520,000

**Contacts:**

Carmine Fiscina	FHWA/FTA Philadelphia Metropolitan Office	(215) 656-7111
Doug May	Pennsylvania DOT	(610) 768-3053



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## SCOOT ADAPTIVE TRAFFIC CONTROL SYSTEM

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**Description:**

This operational test implemented SCOOT in an area of the City of Anaheim's traffic signal system so that it can be evaluated for its effectiveness as an adaptive signal timing control package. SCOOT automates the data collection process and then automatically optimizes traffic signal timing based on real-time traffic conditions. The test also included the installation and evaluation of Video Traffic Detection System (VTDS) cameras in conjunction with the SCOOT system. The VTDS cameras potentially provide a way to adjust the traffic count locations so that optimal data collection sites for the SCOOT system can be identified.

**Project Location :**

Anaheim, California

**Partner(s) :**

City of Anaheim, California DOT (CalTrans), Odetics, PATH, CalPoly University, and University of Southern California

**Start Date:**

September 1993

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$1,153,927

**Estimated Total  
Project Cost:**

\$2,438,427

**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
John Thai	City of Anaheim	(714) 765-5183



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## SEATTLE SMART TRAVELER

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**Description:**

This project examined ways in which mobile communications, such as cellular phones, and information kiosks could be used to make ridesharing (carpooling and vanpooling) more attractive, and evaluated a Traveler Information System. A set of information-based services for ridematching was developed in Phase I in cooperation with the mobile telecommunications industry in an effort to increase the use of HOV facilities. The initial focus advised private auto drivers of rideshare possibilities using mobile communications. A second phase operationally tested a prototype computer-based, interactive commuter information center in an office building in downtown Bellevue. The center provided computerized transit information, rideshare matching, and a method to schedule occasional carpool or vanpool trips. In addition to cellular telephone, the technological applications included voice mail, computer-based ridematching, traffic monitoring computers, and electronic maps.

**Project Location :**

Metropolitan Seattle, Washington

**Partner(s) :**

Bellevue Transportation Management Association (TransManage), University of Washington, City of Bellevue, Washington State DOT, and Municipality of Metropolitan Seattle

**Start Date:**

October 1991

**End Date:**

August 1995

**Estimated Total  
ITS Funds:**

\$100,000

**Estimated Total  
Project Cost:**

\$245,000

**Contacts:**

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195
Mark Haselkorn	University of Washington	(206) 543-2577



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## SEATTLE WIDE-AREA INFORMATION FOR TRAVELERS (SWIFT)

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**Description:** This project tested the delivery of traveler information via three devices: the Seiko Receptor Message Watch, an in-vehicle FM subcarrier radio, and a portable, personal computer. This project also expanded service formerly available under the Bellevue Smart Traveler project.

**Project Location :** Seattle, Washington

**Partner(s) :** Washington State DOT, Seiko Communications Systems, IBM Corporation, Delco, Etak, Metro Traffic, King County (Washington) Metro Transit, and University of Washington

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**Start Date:** August 1994

**End Date:** November 1998

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**Estimated Total  
ITS Funds:** \$4,527,000

**Estimated Total  
Project Cost:** \$7,200,000

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### Contacts:

Mike Morow	FHWA Washington Division, HPM-WA	(360) 753-9411
Larry Senn	Washington State DOT	(206) 543-6741



## SMART CALL BOX

### **Description:**

This operational test took advantage of the extensive call box system installed on California freeways and sought to increase their functionality by adding an interface to traffic management devices. The project included testing the feasibility of using the Smart Call Boxes to collect traffic census data; obtain traffic counts, flows and speeds for incident detection; report information from roadside weather information systems; control changeable message signs; and control roadside closed-circuit television cameras.

### **Project Location :**

San Diego, California

### **Partner(s) :**

San Diego Service Authority for Freeway Emergencies (SDSAFE), California DOT (Caltrans), California Highway Patrol (CHP), and San Diego State University

### **Start Date:**

September 1993

### **End Date:**

September 1996

### **Estimated Total ITS Funds:**

\$915,000

### **Estimated Total Project Cost:**

\$1,607,600

### **Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
David Dutcher	CalTrans	(619) 688-4274
Mike Perkins	S. D. Svc Authority for Freeway Emergencies	(619) 694-2190





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## SPREAD SPECTRUM RADIO TRAFFIC INTERCONNECT

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**Description:**

This operational test evaluated the use of spread spectrum radio to provide communications interconnect for a portion of the Los Angeles ATSAC signal system. The radios were tested in a network of signals to determine their ability to work in a variety of geographies and their ability to provide for large-scale, once-per-second communications, and to determine the cost-effectiveness of using this technology.

**Project Location :**

Los Angeles, California

**Partner(s) :**

City of Los Angeles, Hughes Aircraft, JHK & Associates, California DOT (CalTrans), University of Southern California, and PATH

**Start Date:**

July 1994

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$2,629,075

**Estimated Total  
Project Cost:**

\$3,866,685

**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Shawn Skehan	Los Angeles/ATSAC	(213) 485-2815



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## SUTTER COUNTY, CALIFORNIA

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**Description:**

This project produced an evaluation of deployment of state-of-the-art traffic signal pre-emption equipment, call boxes, automated vehicle location on transit vehicles and emergency vehicle vision enhancement in Sutter County.

**Project Location :**

Sutter County, California

**Partner(s) :**

Sutter County Department of Public Works

**Start Date:**

April 1996

**End Date:**

June 1998

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**Estimated Total  
ITS Funds:**

\$1,750,000

**Estimated Total  
Project Cost:**

\$2,400,000

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**Contacts:**

Frank Cechini

FHWA California Division, HTA-CA

(916) 498-5005

Robert Barrett

Sutter County Department of Public Works

(916) 741-7450

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## TRAFFIC RESEARCH LABORATORY (TREL)

### **Description:**

The TREL is an ATMS testbed which integrates research and development tools into a seamless analysis environment. This project used the TREL testbed to address crucial issues in ATMS such as: the impact of incident detection upon level of service, the effects of dynamic traffic assignment, and system integration issues to help guide ATMS deployment. The Phase I testbed was completed in 1995. It provided the research and analysis capabilities needed to help quantify the benefits of ITS deployment and answer initial critical issues. The Phase II testbed is to provide real-time and faster than real-time simulation capabilities to support emulation of an actual advanced traffic management control center. The Phase II testbed will answer questions such as how to design and implement the functionality of the ATMS control center.

**Project Location :** Colorado Springs, Colorado

**Contractor(s) :** ITT Systems

**Start Date:** September 1993

**End Date:** September 1997

**Estimated Total  
ITS Funds:** \$3,000,000

**Estimated Total  
Project Cost:** \$3,000,000

### **Contacts:**

Raj Ghaman

FHWA - TFHRC, HSR-10

(703) 285-2408



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## TRANSIT COMPUTER TOOLS

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**Description:** This project evaluated computer reservation, dispatching, and billing services for small urban and rural transit operations. Additionally, it identified user records, compared products, and operational inputs and assessed combinations of hardware and software, and investigated procurement guidelines.

**Project Location :** Raleigh, NC

**Contractor(s) :** North Carolina State University

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**Start Date:** September 1996

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$100,000

**Estimated Total  
Project Cost:** \$100,000

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### Contacts:

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366-6678
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John Stone	North Carolina State University	(919) 515-7732
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## TRANSIT NETWORK ROUTE DECISION AID

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**Description:**

This project developed specifications for designing, implementing, and evaluating a computerized information system to aid a telephone operator in rapidly identifying useful itineraries for passengers in a mass transit system. Specifically, it developed a procedure for constructing a decision aid; investigated algorithms and discussed how to extend or specialize them; and developed a plan for decision aid evaluation.

**Project Location :**

Ann Arbor, Michigan

**Contractor(s) :**

University of Michigan - Department of Industrial Operations and Engineering

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**Start Date:**

September 1991

**End Date:**

October 1993

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**Estimated Total  
ITS Funds:**

\$70,000

**Estimated Total  
Project Cost:**

\$70,000

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**Contacts:**

Chelsea White

University of Michigan

(313) 763-5464

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## TRANSIT TECHNOLOGY RESEARCH

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**Description:**

This activity evaluated various new technologies for their potential benefit to transit. Human factors and engineering factors were investigated and designed into ITS systems being developed to maximize benefits to implementation. Spectrum allocation, advanced vehicle location, and architecture studies were conducted for subsequent operational test implementation. This project also studied the transit requirements for an orderly transition into new ITS technologies which are required to allow the maximum benefit.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

**Start Date:**

October 1993

**End Date:**

December 1994

**Estimated Total  
ITS Funds:**

\$160,000

**Estimated Total  
Project Cost:**

\$160,000

**Contacts:**

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195
Bob Ow	Volpe National Transportation Systems Center	(617) 494-2411



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## TRANSLINK RESEARCH AND DEVELOPMENT PROGRAM

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**Description:**

This project, conducted under the auspices of ITS Research Centers of Excellence program, was designed to facilitate the integration of "real-time" ITS system monitoring capabilities into existing and future transportation management systems. Areas of emphasis for TRANSLINK research included linkages between ITS subsystems such as advanced traffic management systems and transit management systems. There was specific focus on railroad integration with ATMS and ATIS and police vehicle subsystem integration with enforcement/response center systems. There is also research emphasis on transportation center automation and support of TRASIM.

**Project Location :**

College Station, Texas

**Contractor(s) :**

Texas A & M, Metropolitan Transit Authority of Harris Co., Texas DOT

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**Start Date:**

March 1996

**End Date:**

September 1998

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**Estimated Total  
ITS Funds:**

\$1,200,000

**Estimated Total  
Project Cost:**

\$1,200,000

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**Contacts:**

David Gibson

FHWA - TFHRC, HSR-10

(703) 285-2407

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## TRANSMIT

**Description:**

The "TRANSMIT" (TRANSCOM's System for Managing Incidents and Traffic) Operational Test evaluated the use of automatic vehicle identification (AVI) technology as an incident detection tool. The system of AVI "tag" readers allows vehicles equipped with transponders to serve as traffic probes. Tag-equipped probe vehicles are assigned a random identification number as they enter a system populated with AVI readers spaced approximately 2 kilometers apart. Software analysis is used to help identify potential incidents by comparing actual to predicted travel times between readers, in addition to determining real-time traffic information such as speed and travel time.

**Project Location :**

Rockland County, New Jersey/Bergen County, New Jersey

**Partner(s) :**

New Jersey DOT, New York State Thruway Authority, New Jersey Highway Authority, TRANSCOM

**Start Date:**

April 1993

**End Date:**

March 1998

**Estimated Total  
ITS Funds:**

\$2,750,000

**Estimated Total  
Project Cost:**

\$3,437,500

**Contacts:**

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Tom Batz	TRANSCOM	(201) 963-4033





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## TRAVLINK

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**Description:**

TravLink implemented an Advanced Traveler Information System and Advanced Public Transportation System along the I-394 corridor extending from downtown Minneapolis, approximately 12 miles to the west. TravLink is a part of the Minnesota Guidestar ITS program and provided real-time transit schedule and traffic information through a combination of kiosks and terminals at work, home, shopping centers, and transit stations.

**Project Location :**

Minneapolis, Minnesota

**Partner(s) :**

Minnesota DOT, St. Paul Metropolitan Council Operations, US West, 3M-Renix, City of Minneapolis, University of Minnesota

**Start Date:**

September 1992

**End Date:**

October 1996

**Estimated Total  
ITS Funds:**

\$4,116,000

**Estimated Total  
Project Cost:**

\$6,956,000

**Contacts:**

Jim McCarthy	FHWA Minnesota Division, HDA-MN	(612) 291-6112
Marilyn Remer	Minnesota DOT Program Manager	(612) 582-1540



## TRAVTEK

### **Description:**

TravTek (Travel Technology ) provided traffic congestion information, motorist services ("yellow pages") information, tourist information and route guidance to operators of 100 test vehicles, rented through AVIS, that were equipped with in-vehicle TravTek devices. Route guidance reflected real time traffic conditions in the TravTek traffic network. A Traffic Management Center obtained traffic congestion information from various sources and provided this integrated information, via digital data radio broadcasts, to the test vehicles and the data sources. TravTek rental operations began in March 1992. The operations phase ended in March 1993. The data collection for project evaluation is completed. Eight final evaluation reports were made available in late 1995. A video has been developed to disseminate information on the TravTek evaluation project. The video serves as an executive summary for the project, providing information on the overall project goals and objectives, the public/private partnership created to carry out the effort, the system design approach, the key evaluation questions, and finally a summary of the results from the evaluation activities. The video was developed for FHWA by SAIC in consultation with the TravTek partners. In addition to the TravTek partners, the National Highway Traffic Safety Administration participated in the TravTek evaluation. All reports have been completed.

### **Project Location :**

Orlando, Florida

### **Partner(s) :**

City of Orlando, Florida DOT, General Motors/Hughes, and American Automobile Association (AAA)

### **Start Date:**

January 1990

### **End Date:**

March 1996

### **Estimated Total ITS Funds:**

\$4,200,000

### **Estimated Total Project Cost:**

\$12,000,000

### **Contacts:**

Robert Rupert

FHWA Headquarters, HTV-3

(202) 366-2194

Grant Zammit

FHWA Florida Division

(850) 942-9693



## TRILOGY

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**Description:**

The Trilogy project is part of the Minnesota statewide ITS program, Guidestar. Trilogy provides traveler information through different communications techniques: the Radio Broadcast Data System-Traffic Message Channel (RBDS-TMC), and a high-speed FM subcarrier. The primary objective of Trilogy is to test and compare a range of user devices and evaluate the potential improvement in efficiency of the existing transportation network. These devices provide end users with area and route-specific en-route advisories on the highway operating conditions in the Twin Cities Metropolitan Area.

**Project Location :**

Twin Cities Metropolitan Area

**Partner(s) :**

Minnesota DOT, AB Volvo, DCI, Sieko Communications Systems, and Indikta Displays

**Start Date:**

July 1994

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$2,776,000

**Estimated Total  
Project Cost:**

\$4,080,000

**Contacts:**

Jim McCarthy	FHWA Minnesota Division, HDA-MN	(612) 291-6112
Gary Hallgren	Minnesota DOT - Metro Division	(612) 341-7500



## WASHINGTON, D.C. ADVANCED FARE MEDIA

### **Description:**

The purpose of this project was to develop and demonstrate an advanced Integrated Fare Collection System that would employ advanced technologies, improve security, and allow the sale and use of long term transit pass while assuring reliability and security against fraudulent abuse. Washington Metro Area Transit Authority (WMATA) selected Cubic's Go-Card System, a proximity reader/encoder that activates the fare gates when the passenger holds the pass within inches of the reader. The fare media also accommodated debiting the card on exiting the system and having the capability to integrate the fare collection system throughout the Authority by allowing passengers to use the same fare media to pay for Metrorail, Metrobus, and parking. The new system was installed in both directions of at least two aisles on as many as possible of the 93 mezzanines at the 70 stations. The system worked in conjunction with, or in addition to, the equipment currently being used and did not reduce the capabilities of the existing equipment.

Fare collection equipment has been installed at 29 Metro stations, on 21 buses and at 5 parking lots. The system was installed and put into operation February 6, 1995, for a one year demonstration period.

**Project Location :** Washington, DC metropolitan area

**Partner(s) :** WMATA and Cubic

**Start Date:** December 1994

**End Date:** February 1996

**Estimated Total  
ITS Funds:** \$997,899

**Estimated Total  
Project Cost:** \$997,899

### **Contacts:**

Irv Chambers	FTA Headquarters, TRI-11	(202) 366-0238
Ramon Abromovich	Washington Metropolitan Area Transit Authority	(202) 962-5274



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## WINSTON-SALEM MOBILITY MANAGEMENT

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**Description:**

This project defined and identified system needs and operationally tested and evaluated a mobility management system for the City of Winston-Salem. It included automated scheduling and demand-responsive, shared-ride transit for the young, elderly, and disabled who are unable to use fixed-route transit (Phase I). The project extended the transportation service to fixed-route transit, ridesharing and taxis used by the general public (Phase II). Integration with the Winston-Salem traffic management program was accomplished. Technologies being investigated also include smart cards, GPS, and automatic vehicle location.

**Project Location :**

Winston-Salem, North Carolina

**Partner(s) :**

Winston-Salem Transit Authority (WSTA), City of Winston-Salem, North Carolina DOT, and North Carolina State University's Institute for Transportation Research and Education

**Start Date:**

May 1993

**End Date:**

September 1995

**Estimated Total  
ITS Funds:**

\$220,000

**Estimated Total  
Project Cost:**

\$275,000

**Contacts:**

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195
John Stone	North Carolina State University	(919) 515-7732



### **III. INTELLIGENT RURAL INFRASTRUCTURE**

### **III. INTELLIGENT RURAL INFRASTRUCTURE**

Rural America accounts for a small and dispersed portion of our nation's population, yet it encompasses a significant portion of the transportation system. Rural areas account for 80% of the total U.S. road mileage and 40% of the vehicle miles traveled, and there is a unique set of characteristics associated with this system. Consequently, rural travelers have ITS needs similar to those experienced by their urban counterparts, though the priority of these needs differs. These differences reflect the rural environment characterized by long distances, relatively low traffic volumes, relatively rare traffic congestion, travelers unfamiliar with their surroundings, and rugged terrain in remote areas. Furthermore, rural characteristics soliciting ITS solutions include an over representation of fatal crashes (about 60% of traffic fatalities and 55% of work zone fatalities occur in rural areas), safety problems related to high speeds on non-interstate rural roads and increased response time for Emergency Medical Services.

Early ITS efforts were driven by the desire to address growing transportation problems in urban areas and in interurban corridors. While many of the technologies and systems aimed at solving these problems also have application outside urban settings, the market structure, application logistics, and motivating factors underlying their deployment vary considerably from urban to rural areas. During 1996, U.S. DOT developed the Advanced Rural Transportation Systems (ARTS) Strategic Plan which covers the Federal ARTS program's role in developing and fostering the application of Intelligent Transportation Systems in rural areas. The Strategic Plan describes the vision, mission, goals, objectives, and measures that provide the foundation upon which the Federal ARTS program is built. A companion Program Plan has been developed which describes what is known and unknown within each cluster, sets the strategic priorities, and lays out the program (projects by year) to solve the unknowns. Together they provide the roadmap for the Federal ARTS program through the year 2003.

Achieving the strategic objectives of the Federal ARTS program means recognizing the extremely diverse nature of the rural transportation system. Diversity is exhibited in the system's wide-range of motorists, managers, maintenance staff, operators, road types, terrain, climates, jurisdictions, land use, and seasonal characteristics. These diverse characteristics translate into a wide variety of needs, problems, and opportunities for improvement. Consequently, the ARTS solutions, i.e., the application of advanced technologies to meet these disparate needs, problems and opportunities, must be diverse as well. The strategies to identify these solutions must also recognize this diversity.

Given this diversity of the rural transportation system, and the wide breadth of the program (i.e., encompassing a large number of needs of a large number of users), the ARTS program has been organized into seven Critical Program Areas (CPA). It was found that while rural settings differ greatly (Jackson Hole, Wyoming, vs. Death Valley, California, vs. Cape Cod, Massachusetts), there was general agreement on the classes of needs that exist within each setting and the principal users of ITS. The clusters were therefore developed around Major Needs and Service Groupings and are:

- Traveler Safety and Security - Consists of technologies which alert drivers to hazardous conditions and dangers, and include wide-area information dissemination of site-specific safety advisories and warnings.
- Emergency Services - Systems which improve emergency response to serious crashes in rural areas including technologies that automatically mobilize the closest police, ambulances, or fire fighters in cases of collisions or other emergencies, even in the most remote locations.
- Tourism and Travel Information Services - These provide information to travelers who are unfamiliar with the local rural area. These services can be provided at specific locations, en route, or well in advance of the traveler's destination.
- Public Traveler Services/Public Mobility Services - These services strive to improve the efficiency of transit services and their accessibility to rural residents. Advanced vehicle locating devices and communications systems can help achieve better scheduling, improved dispatching, smart card payment transactions, and advanced ridesharing and ride-matching systems.
- Infrastructure Operations and Maintenance - Leverage technologies that improve the ability of our highway workers to maintain and operate rural roads. These include severe weather information systems, early detection of pavement and bridge failures, and immediate detection of dangers to work zone crews.
- Fleet Operations and Maintenance - These systems improve the efficiency of rural transit and other rural fleets, such as snowplows and even law enforcement vehicles, through advanced vehicle tracking and on-board equipment monitoring systems.
- Commercial Vehicle Systems - These are designed to manage the movement and logistics of commercial vehicles in rural settings, and locate them during emergencies and breakdowns. These include applications to improve safety, such as warnings associated with slow-moving vehicles, and scheduling applications for harvest season when vast numbers of trucks are needed during a very small time window.

The above division is the primary dimension for this cluster concept and focuses on identifiable needs categories. Tourism and Travel Information Services for example refer to the needs that a visitor (both driver and passenger) unfamiliar with a rural area may require as well as the Visitors and Tourism Bureaus, transit service providers, information providers, etc., that provide the services to meet their needs. In a tourist resort area, this may be the main focus of the ITS program. In other areas it may exist but play a smaller role. Likewise, the Public Traveler Services/Public Mobility Services focuses on reducing the isolation of the transportation disadvantaged and increasing the mobility of all. Its constituents also include both the potential travelers and service providers. Because of the costs of the provision of services in rural areas,



the operations and maintenance activities may also form their own divisions. As ITS services are shown to reduce the cost of these services and improve their efficiency, these areas and the organizations responsible for providing them become natural constituents and advocates for the programs.

ITS applications such as incident notification (cellular and Mayday), advanced hazard warning systems, advanced traveler information services, and in-vehicle crash avoidance systems, are some of the ITS applications which can address the issues above and significantly impact the safety and mobility of rural travelers. Other ITS R&D programs within NHTSA and FHWA have substantial rural components--that is, they examine crash avoidance/warning, traveler information, vehicle control, automated roadway, or other safety technologies that have primary applications in improving rural safety.

An additional innovation was the documenting of successful rural ITS applications to serve as a resource for decision makers planning future rural deployments. This effort includes an “on-line” ARTS Compendium of some 200 ITS-related projects in rural settings and a publication on low cost, low technology ITS success stories for rural areas titled *Technology in Rural Transportation: Simple Solutions*.

The operational tests described in this section reflect recent initiatives in rural public transportation, integrated weather information and rural travel and tourism. These projects highlight the unique and varied challenges faced by the rural travel environment. A clear example of the need to adapt the deployment of technologies to this environment is exemplified in ITS emergency services. This is a critical application in rural areas where response times are normally greater than in metropolitan areas. This is one of several technology applications requiring further testing and evaluation. Others focused on cellular telephone coverage and road weather information systems are more mature, and better prepared for deployment.

U.S. DOT is advocating a three-step approach to the rural ITS program. The initial step – **development** – encompasses research, operational tests and examination of system integration issues, especially those associated with standards and application of the National ITS Architecture. The second step – **facilitating deployment** – seeks to stimulate a disciplined and incremental approach which encourages rural jurisdictions to define the technologies they want to integrate into their systems, and then gradually build toward the ultimate system in modest subsystem incremental deployments. The final program step – **delivery** – strives toward successful outreach, fostering technical development and professional capacity building.

# **Traveler Safety and Security**

# ADVANCED TRANSPORTATION WEATHER INFORMATION SYSTEM

## **Description:**

This project is to provide an evaluation and demonstration of how current technologies in mesoscale meteorological analysis and forecasting can be effectively used to produce precise spatial and temporal weather information for integration into an Advanced Transportation Information System for safer and more efficient operations. Through this evaluation and demonstration, a prototype information and management center to support traffic weather analysis and forecasting in a responsive decision support environment will be developed. This system will be capable of providing immediate assessment of difficulties in travel arising from changing weather conditions. This project will demonstrate a prototypical advanced weather information system which may be implemented on a larger national scale.

## **Project Location :**

North Dakota and South Dakota

## **Partner(s) :**

North Dakota DOT, South Dakota DOT, University of North Dakota, U.S. West Communications, North Dakota Highway Patrol, South Dakota Highway Patrol, NOAA/Forecast Systems Lab, and Surface Systems Inc.

## **Start Date:**

May 1995

## **End Date:**

October 1999

## **Estimated Total ITS Funds:**

\$3,525,000

## **Estimated Total Project Cost:**

\$4,406,250

## **Contacts:**

Steve Busek	FHWA North Dakota Division, HDA-ND	(701) 250-4348
Leon Osborne	University of North Dakota	(701) 777-2479



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## FORETELL - INTEGRATING ITS WITH ADVANCED WEATHER PREDICTION

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**Description:**

The project objectives are twofold: (1) to develop an integrated weather information system that improves and broadens the scope of atmospheric and road surface condition information available to highway users and operators; and (2) to assess the benefits of integrating the functions of Road Weather Information Systems, other weather information sources, and transportation management and traveler information operations for a rural section of the transportation system.

**Project Location :**

Iowa, Wisconsin, Missouri, Minnesota, Illinois

**Partner(s) :**

Iowa DOT, Missouri DOT, Wisconsin DOT

**Start Date:**

October 1997

**End Date:**

March 2000

**Estimated Total ITS Funds:**

\$1,300,000

**Estimated Total Project Cost:**

\$4,450,000

**Contacts:**

Paul Pisano	FHWA - TFHRC, HSR-30	(703) 285-2498
Jim Hogan	FHWA Iowa Division, HDV-IA	(515) 233-7305



# GREATER YELLOWSTONE RURAL ITS PROJECT

## **Description:**

One of the key products to be developed as a part of this project is a Strategic Deployment Plan for the Greater Yellowstone Rural ITS Project. This effort will address the feasibility, demonstrate and evaluate how current ITS technologies may be applied as a viable solution to addressing travel and safety issues in a rural transportation environment. The specific setting of the project encompasses the three major transportation corridors in the surrounding states of Idaho, Wyoming and Montana which travelers use to access the National Park.

The Greater Yellowstone Rural ITS Project will also serve as a testbed for rural ITS applications to facilitate moving the state-of-the art in Advanced Rural Transportation Systems forward. This project will support a limited amount of deployment and testing of the short term projects identified as priorities in the Strategic Deployment Plan. The ability to provide information to travelers has been identified as one of the key needs to be addressed in the initial study. The initial goals identified for the study include increasing safety, improving emergency response, improving commercial vehicle operations, increasing travel information and trip enhancement, improving interagency communications, reduce congestion and increase economic activity.

Early winner projects identified in the Strategic Deployment Plan are under development. Early winner projects include an AVI system test for two entrances into the Yellowstone National Park. Other projects include interactive kiosks at locations within the National Parks, Cellular Incident Hotline Reporting, signing, dynamic warning signs, and an incident management plan for roadway closures.

## **Project Location :**

Idaho and Montana; US 191/20 from Bozeman, MT to Idaho Falls, ID; I-15 from Butte, MT to Idaho Falls, ID (including I-90 from Bozeman to Butte); US 89/26 from Livingston, MT to Idaho Falls, ID (including I-90 from Bozeman MT to Livingston MT).

## **Partner(s) :**

Idaho DOT, Western Transportation Institute, Montana DOT, Wyoming DOT, National Park Service, Idaho National Engineering Laboratory, Idaho State Police, Travel Montana, Gallatin (MT) County

**Start Date:** June 1997

**End Date:** June 1999

**Estimated Total ITS Funds:** \$1,500,000

**Estimated Total Project Cost:** \$1,850,000

## **Contacts:**

Bob Seliskar	FHWA Montana Division, HDT-MT	(406) 441-1234	Ext. 244
Ross Tervo	Montana DOT	(406) 444-9237	
Steve Albert	Western Transportation Institute	(406) 994-6114	



## HERALD EN-ROUTE DRIVER ADVISORY SYSTEM VIA AM SUBCARRIER

### **Description:**

The main concept of this project is to disseminate traveler information in difficult-to-reach, remote rural areas using a subcarrier on an AM broadcast station. The three basic components of Herald -- message generation, message transmission and message reception -- have been developed under an effort by the multi-state organization called ENTERPRISE. This project will determine the performance of the system and analyze the impacts on broadcasters, travelers and equipment manufacturers. The primary objective of this test will be to assess real world impacts of the system related to transmission of traveler information in challenging terrain (Colorado), potentially interfering environmental conditions (Iowa), improvements to safety, and the overall marketability of the system.

### **Project Location :**

Colorado and Iowa

### **Partner(s) :**

Modulation Sciences and members of the ENTERPRISE group (Departments of Transportation from the States of Arizona, Colorado, Iowa, Michigan, Minnesota, North Carolina and Washington State, and the Dutch Ministry of Transport, Ministry of Transportation of Ontario, and Transport Canada)

### **Start Date:**

January 1995

### **End Date:**

June 1999

### **Estimated Total ITS Funds:**

\$200,000

### **Estimated Total Project Cost:**

\$380,000

### **Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
John Whited	Iowa DOT	(515) 239-1411	



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## IDAHO STORM WARNING SYSTEM

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**Description:**

The purpose of the Idaho Storm Warning Operational Test is to investigate various sensor systems that could provide accurate and reliable visibility and weather data, and to use that data to provide general warnings, speed advisories, and possible road closure information to travelers on a section of I-84 in southeast Idaho that is highly prone to reduced visibility from blowing snow and dust. The primary goal of such a system is a major reduction in visibility-related multi-vehicle accidents in rural areas. Information will be transmitted to the motorist via changeable message signs.

**Project Location :**

Interstate 84 in southeastern Idaho.

**Partner(s) :**

Idaho Transportation Department, CH2M Hill, Handar Incorporated, Santa Fe Technologies, and Surface Systems Incorporated

**Start Date:**

June 1993

**End Date:**

August 2000

**Estimated Total  
ITS Funds:**

\$804,500

**Estimated Total  
Project Cost:**

\$1,231,900

**Contacts:**

Ross Blanchard	FHWA Idaho Division, HDA-ID	(208) 334-9180	Ext. 112
Larry Vanover	Idaho Transportation Department	(208) 334-8558	



## TRAVEL - AID

### **Description:**

This project will use variable speed limit signs, variable message signs, and in-vehicle communications and signing equipment to improve safety along a 40-mile stretch of I-90 across Snoqualmie Pass, a rural area prone to snow, ice and poor visibility. Electronic sensing and equipment will be installed to monitor traffic, speeds, road and weather conditions. This information will help determine a safe speed. Warnings about road conditions, accidents, or slow-moving equipment will be broadcast via the various devices. The in-vehicle message device would have an alert signal to inform the motorist that a message is available. Up to 200 vehicles will be equipped with devices to deliver information similar to that displayed from the roadway variable message sign system.

### **Project Location :**

Snoqualmie Pass, Washington State

### **Partner(s) :**

Washington State DOT, Farradyne Systems Inc., Engineering Research Associates (ERA), General Logistics, Surface Systems Incorporated (SSI), University of Washington - Washington State Transportation Center (TRAC), and Traffic Master

### **Start Date:**

November 1992

### **End Date:**

June 1999

### **Estimated Total ITS Funds:**

\$1,828,525

### **Estimated Total Project Cost:**

\$4,700,291

### **Contacts:**

Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Larry Senn	Washington State DOT	(206) 543-6741





# SULLIVAN COUNTY, NEW YORK EMERGENCY WEATHER SYSTEM

## **Description:**

This project will fund the installation of a weather station, Highway Advisory Radio and Variable Message Signing to warn drivers of changing conditions of the roadway in time for motorists to react safely. Detours will be established to aid drivers when incidents occur. The 14-mile segment of highway, constructed to 1950's standards, traverses mountainous terrain. High accident rates are experienced where roadway alignment is severe and climatic changes surprise drivers.

## **Project Location :**

Sullivan County, New York

## **Partner(s) :**

New York State DOT

## **Start Date:**

October 1998

## **End Date:**

October 2000

## **Estimated Total ITS Funds:**

\$1,000,000

## **Estimated Total Project Cost:**

\$1,250,000

## **Contacts:**

Jerry Zell	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 228
Robert MacMonigle	New York State DOT	(607) 721-8069	



# **Emergency Services**

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## AUTOMATED COLLISION NOTIFICATION (ACN) OPERATIONAL FIELD TEST

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**Description:** This project is an operational field test of an advanced in-vehicle system that determines that a serious collision has occurred and automatically summons Emergency Medical Services (EMS) response. The Team will design, build and deploy an automated collision notification system (ACN), using 1000 privately owned cars in a large area covering the western portion of New York State.

**Project Location :** Erie County, New York

**Partner(s) :** CALSPAN Advanced Technology Center, the New York DOT, General Motors, Cellular One, Rockwell, Erie County Emergency Management Service

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**Start Date:** September 1995

**End Date:** October 1999

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**Estimated Total  
ITS Funds:** \$3,472,358

**Estimated Total  
Project Cost:** \$4,335,453

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### Contacts:

Arthur Carter

NHTSA, NRD-51

(202) 366-5669

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## I-87 CELLULAR TELEPHONE DEMONSTRATION

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**Description:** This project provides "Caller ID" for calls received by the New York State Police 911 system.

**Project Location :** New York

**Partner(s) :** New York State DOT and New York State Police

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**Start Date:** September 1991

**End Date:** March 1999

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**Estimated Total  
ITS Funds:** \$50,000

**Estimated Total  
Project Cost:** \$50,000

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### Contacts:

Mike Schauer	FHWA New York Division, HDT-NY	(518) 431-4125
Paul Cuerhon	New York State DOT	(518) 474-6377

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## WASHINGTON STATE RADIO COMMUNICATION EMERGENCY CALL BOXES

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**Description:**

This project will provide emergency call boxes using radio communications technology throughout the State Route 821 Corridor. State Route 821 follows the Yakima River through a canyon with no cellular phone coverage. There are few businesses or residences along the road so there is no place to stop for assistance. When roadway accidents or river rafting accidents occur, there is no timely way to alert emergency service providers. This project will remedy that condition. The Washington DOT will be able to incorporate the emergency call boxes into the Smart Trek Model Deployment Initiative.

**Project Location :**

Washington State

**Partner(s) :**

Washington State DOT

**Start Date:**

October 1998

**End Date:**

October 2000

**Estimated Total  
ITS Funds:**

\$750,000

**Estimated Total  
Project Cost:**

\$987,500

**Contacts:**

Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Bill Legg	Washington State DOT	(206) 543-3332



# **Tourism and Travel Information**

## RURAL APPLICATIONS OF ADVANCED TRAVELER INFORMATION SYSTEMS

### **Description:**

This study examined Advanced Traveler Information Systems (ATIS) for rural applications. The research examined a broad range of rural environments, categories of travelers, ATIS applications, and advanced electronic and communication technologies. The study involved determining the needs for ATIS services in rural and small urban areas and developing the functional requirements for providing them. The feasibility and cost-effectiveness of alternative applications and Advanced Traveler Information Systems related technologies was assessed. Based upon these analyses, priorities and plans for subsequent prototyping and operational field testing were developed. The most promising rural ATIS applications were developed and tested in a limited rural environment; including an evaluation of satellite communications for Mayday and a Surveillance and Delay Advisory System. A similar process to assess rural transit user and operator needs and system concept development was also conducted. Several reports have been published.

Focus group discussions and telephone survey of rural travel needs and concerns have been completed. Some 20 preliminary concepts developed to meet rural travel needs were evaluated in terms of potential cost, benefits, implementation issues and trade-offs. A rural Action Plan was developed. Mayday satellite communications study, and preliminary testing of a Surveillance and Delay Advisory System (SDAS) have been completed. Further SDAS testing was completed in the summer, 1998. Test results are being evaluated.

**Project Location :** Virginia

**Contractor(s) :** TransCore (formerly JHK & Associates) (lead), Hughes, Virginia Tech, and Bell-Atlantic

**Start Date:** January 1993

**End Date:** February 1999

**Estimated Total ITS Funds:** \$2,140,853

**Estimated Total Project Cost:** \$2,153,353

### **Contacts:**

Paul Pisano

FHWA - TFHRC, HSR-30

(703) 285-2498



# ARIZONA I-40 TRAVELER AND TOURIST INFORMATION SYSTEM

## **Description:**

The I-40 Interstate Corridor is the only access to a number of National Parks and tourist centers in the region. The purpose of this project is to evaluate various means of providing traveler information to visitors traveling to and from the Grand Canyon National Park, Petrified Forest National Park, Navajo Nation, various welcome/tourist information centers, Arizona Department of Tourism's Painted Cliffs Welcome Center, Little America truck stop in Flagstaff, Kingman port-of-entry, and 25 other recreation areas. It incorporates multimodal components such as commercial vehicle operations, transit, parking management and information systems.

## **Project Location :**

Arizona I-40 Corridor

## **Partner(s) :**

Arizona DOT; Grand Canyon National Park; National Weather Bureau; Winslow Chamber of Commerce; Arizona Department of Public Safety; AZ Office of Tourism; Northern Arizona University; Arizona State University; City of Bullhead; Computran Systems Corp.; Kimley-Horn & Assoc.; Castle Rock Consultants, Inc.; Fastline; Smartroute Systems, Inc., Transmit Technologies, Inc.

## **Start Date:**

October 1997

## **End Date:**

May 1999

## **Estimated Total ITS Funds:**

\$250,000

## **Estimated Total Project Cost:**

\$3,350,000

## **Contacts:**

Alan Hansen	FHWA Arizona Division, HPR1-AZ	(602) 379-6856
Tim Wolfe	Arizona DOT	(602) 255-6622





## BRANSON, MISSOURI TRIP (TRAVEL AND RECREATIONAL INFORMATION PROJECT)

### **Description:**

Branson, a rural community located in the heart of the Ozark Mountains, has become known as the live entertainment capital of the world. The pristine natural surroundings of Branson have always attracted large numbers of visitors. The Branson TRIP seeks to provide Branson Tri-Lakes area tourists with comprehensive tourist attractions, weather, traffic and road construction information. This information will be provided through technologies such as the World Wide Web, dial-in telephone services, changeable message signs, highway advisory radio, commercial radio, kiosks, and cable television. The project will evaluate those means of conveying information.

### **Project Location :**

Branson, Missouri

### **Partner(s) :**

Missouri DOT; City of Branson, MO; Missouri Division of Tourism; Stone County, Taney County, Southwest Missouri Advisory COG; Branson/Lakes Area Chamber of Commerce; Table Rock Lake Chamber of Commerce, Castle Rock/Black Veatch; Addco; Intuitive Solutions; The Branson Connection; The Vacation Channel

### **Start Date:**

October 1997

### **End Date:**

May 1999

### **Estimated Total ITS Funds:**

\$600,000

### **Estimated Total Project Cost:**

\$1,325,000

### **Contacts:**

Pam Crenshaw	FHWA Headquarters, HTV-3	(202) 366-1482
Bob Thomas	FHWA Missouri Division, HOP-MO	(573) 636-7104
Tom Ryan	Missouri DOT	(573) 526-0124



# CAPE COD RURAL ADVANCED INTERMODAL TRANSPORTATION SYSTEM

## **Description:**

This project will evaluate the use of Automatic Vehicle Location systems on fixed route, shuttle, paratransit and Council of Aging transit vehicles. A customer information system will be developed with multi-modal information for dissemination through various media designed to greatly enhance the reliability of transit service on the Cape.

## **Project Location :**

Cape Code Region, Cape Cod, MA

## **Partner(s) :**

Bridgewater State College, Bridgewater, MA

## **Start Date:**

October 1997

## **End Date:**

June 1999

## **Estimated Total ITS Funds:**

\$200,000

## **Estimated Total Project Cost:**

\$408,000

## **Contacts:**

William Wiggins	FTA Headquarters, TRI-11	(202) 366-0255
Dennis Walsh	Cape Cod Regional Transit Authority	(508) 385-8311
Larry Harman	Bridgewater State College	(508) 279-6144



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# FRANKLIN COUNTY, MASSACHUSETTS TRAVEL INFORMATION SYSTEM

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**Description:**

A Traveler Information Service for the Route 2 Corridor of Central and Western Massachusetts. The purpose of the project is to provide the tourist, en route traveler, and commercial vehicle operator with relevant information on local attractions and services in the project area, combined with relevant information on traffic and weather conditions on Route 2 and I-91. The two principal goals of the project are to increase tourism and enhance motorist safety through the provision of traveler information.

**Project Location :** Franklin County, MA

**Partner(s) :** Massachusetts Highway Department

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**Start Date:** September 1998

**End Date:** December 1999

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**Estimated Total  
ITS Funds:** \$875,000

**Estimated Total  
Project Cost:** \$1,093,750

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**Contacts:**

Rick Marquis

FHWA Massachusetts Division, HDA-MA

(617) 494-3275

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# **Public Travel and Mobility Services**

## BLACKSBURG RURAL TRAVELER INFORMATION SYSTEM

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### **Description:**

This project will operationally test a rural transit traveler information system that will make the transit system easier to use and more reliable for the user. Based upon a system-wide AVL, a real-time traveler information system will be provided through kiosks, wayside stops, and an existing "electronic village". Blacksburg Transit (town of Blacksburg, VA) operates twenty-seven buses on eight fixed-routes. Daily ridership is 8,500 during the academic year. The transit system covers 642,000 miles annually, which includes a five-vehicle demand-responsive system.

**Project Location :** Blacksburg, Virginia

**Partner(s) :** Town of Blacksburg, Virginia

**Start Date:** July 1996

**End Date:** June 1999

**Estimated Total  
ITS Funds:** \$240,000

**Estimated Total  
Project Cost:** \$477,024

### **Contacts:**

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-6656
Mike Connelly	Blacksburg Transit	(540) 961-1185



# NORTH FLORIDA RURAL TRANSIT INTELLIGENT TRANSPORTATION SYSTEMS

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**Description:**

This project will assist in providing regional, multi-agency application of Intelligent Transportation Systems (ITS) technologies to three different countywide rural transit systems in Flagler, Putnam, and St. Johns counties in north Florida. The resulting electronic coordinated transit service provides transportation for the public for the purpose of job training, employment, medical service, nutrition trips, rehabilitation, and other life-sustaining functions. This project will be a national model in initiating regional, electronically coordinated transit service in rural areas involving several transit organizations. ITS technologies being considered include automatic vehicle location (AVL) systems using geographic positioning systems (GPS), and automated scheduling, dispatching, and billing software.

**Project Location :** Florida

**Partner(s) :** Flagler County Transport; ARC Transit of Putnam County, St. John's County Council on Aging

**Start Date:** September 1997

**End Date:** April 2000

**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$240,000

**Contacts:**

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195
Jennifer Bowers	Florida Comm. for the Transp. Disad.	(940) 488-6036



# **Infrastructure Operation and Maintenance**

# AN AUTOMATED VEHICLE LOCATION PILOT SYSTEM IN A MAINTENANCE OPERATIONS SETTING

## **Description:**

This project will evaluate the use of an Automated Vehicle Location (AVL) system to aid in the administration of snow removal and ice control contract forces, and provide information concerning road conditions to the public and media and the management and performance of snow removal and ice control operations. The benefits anticipated from this system include: continuous location of snowplow fleet operations; ability to identify vehicles with abnormal behavior; increased safety for the vehicle operator; ability to detect and minimize waste and fraud; ability to capture statistical data; and improved communications efficiency. The evaluation will also focus on the benefits of incorporating snow and ice removal status received from the AVL system into traveler information programs in the Northern Virginia District.

**Project Location :** Northern Virginia District

**Partner(s) :** Virginia DOT

**Start Date:** August 1997

**End Date:** September 1999

**Estimated Total  
ITS Funds:** \$50,000

**Estimated Total  
Project Cost:** \$850,000

## **Contacts:**

Chung Eng	FHWA Headquarters, HTV-3	(202) 366-8043
Andy Mergenmeier	FHWA Virginia Division, SHA-VA	(804) 281-5134
Emiliano Lopez	Virginia DOT	(804) 786-0186





## ALASKA COLD WEATHER ITS SENSING

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**Description:**

This project would fund the initial development of a Roadway Weather Information System (RWIS) for the Alaska Department of Transportation and Public Facilities. This initial improvement would include two small operational RWIS systems, centered in the Anchorage and Valdez areas, and also would install several data collection sites in Juneau. The system would provide weather and pavement information to support maintenance and operations activities, particularly winter snow and ice control on highways.

**Project Location :** Anchorage and Valdez, Alaska

**Partner(s):** Alaska DOT and PF

**Start Date:** October 1998

**End Date:** September 2000

**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$1,250,000

**Contacts:**

Al Fletcher	FHWA Alaska Division, HDA-AK	(907) 586-7245
Douglas Terhune	Alaska DOT and PF	(907) 269-0885



## SOUTHEAST MICHIGAN SNOW AND ICE MANAGEMENT (SEMSIS)

### **Description:**

This is a cooperative initiative between the Road Commission for Oakland County, Wayne County, Macomb County and the City of Detroit. The four entities have agreed to share data and equipment to improve the snow and ice removal activities in southeast Michigan. This would be a wide scale deployment with the goal of reducing winter storm maintenance costs. It will employ AVL, CAD and GIS technologies. It will include software to display road network status, vehicle status, and meteorological data in real-time.

### **Project Location :**

Oakland Co., Wayne Co., Macomb Co., City of Detroit, Michigan

### **Partner(s) :**

Road Commission for Oakland County, Wayne County, Macomb County, MI; City of Detroit, MI

### **Start Date:**

October 1998

### **End Date:**

January 2002

### **Estimated Total ITS Funds:**

\$1,150,000

### **Estimated Total Project Cost:**

\$2,437,500

### **Contacts:**

David Helman	FHWA Headquarters, HTV-3	(202) 366-8042
Morrie Hoevel	FHWA Michigan Division, HDA-MI	(517) 377-1880
Marie Dionise	Michigan State DOT	(517) 335-0875
Gary Piotlowicz	Road Commission for Oakland County	(248) 858-7250



# WASHINGTON STATE ROADWAY WEATHER INFORMATION SYSTEM

## **Description:**

This project will connect a local weather information system around the state into a roadway weather information system. The information would be used to provide statewide road condition reports to motorists, thereby reducing the effects of weather condition on travelers. The project will include the installation of closed circuit TV cameras on I-90 at Snoqualmie Pass. The Washington State DOT will be able to incorporate this weather information system into the Smart Trek Model Deployment Initiative.

## **Project Location :**

Washington State

## **Partner**

Washington State DOT

## **Start Date:**

October 1998

## **End Date:**

October 1999

## **Estimated Total ITS Funds:**

\$1,250,000

## **Estimated Total Project Cost:**

\$1,600,000

## **Contacts:**

Mike Morrow

FHWA Washington Division, HPM-WA

(360) 753-9411

Guy Coss

Washington State DOT

(206) 685-9247



# **Special Purpose**

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## DEVELOPMENT OF RURAL ITS

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**Description:**

The main objectives of this FHWA-sponsored effort specifically includes:

- Assisting the U.S.DOT Rural Team in ARTS program management, procurement, development, coordination, and promotion;
- Conducting the comprehensive system engineering efforts necessary for integration of Rural ITS requirements into the National ITS program;
- Conducting specific studies, providing technical assistance, and participating in other activities to define and better understand the technical, institutional, and implementation issues surrounding the development and deployment of Rural ITS; and
- Developing products that document the system design and other Rural ITS findings in a variety of formats that aid in the implementation of this system design by federal, state, and local governments, private industry, and other constituents.

These objectives will be met through a set of task orders; each task order will be issued as needed.

**Project Location :**

Washington, D.C.

**Contractor:**

SAIC, Castle Rock Consultants, Multisystems, Inc., Western Transportation Institute

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**Start Date:**

October 1998

**End Date:**

September 2003

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**Estimated Total  
ITS Funds:**

\$10,706,742

**Estimated Total  
Project Cost:**

\$10,706,742

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**Contacts:**

Paul Pisano

FHWA – TFHRC, HSR-30

(703) 285-2498

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## **Completed Projects**

# ADVANCED RURAL TRANSPORTATION INFORMATION AND COORDINATION

## **Description:**

The Advanced Rural Transportation Information and Coordination (ARTIC) project is part of the Minnesota Statewide ITS program, Guidestar. ARTIC coordinated the communications systems of several public agencies (highway, state patrol, and transit) by establishing a centralized communication site. Improvements are expected in response time to accident and road condition emergencies, and real-time vehicle status and schedule information will be provided through ARTIC. The primary objective of ARTIC is to evaluate the improvement in the transportation system and traveler safety by establishing a centralized communication site.

## **Project Location :**

Itasca and St. Louis Counties, Minnesota

## **Partner(s) :**

Minnesota DOT, Minnesota State Patrol, Arrowhead Transit, City of Virginia Transit, Arrowhead Regional Development Commission, and U.S. West

## **Start Date:**

July 1994

## **End Date:**

August 1998

## **Estimated Total ITS Funds:**

\$903,000

## **Estimated Total Project Cost:**

\$1,542,000

## **Contacts:**

Jim McCarthy	FHWA Minnesota Division, HDA-MN	(612) 291-6112
Richard Maddern	Minnesota DOT	(218) 749-7793



## COLORADO MAYDAY SYSTEM

### **Description:**

This project evaluated the use of the Global Positioning System (GPS) for vehicle location, and the impact of cellular infrastructure communications between the vehicle and Public Service Answering Points (PSAPs) providing emergency and non-emergency assistance operating in an area of over 12,000 square miles in north-central Colorado. The test involved vehicles equipped with a low-cost location device called TIDGET. The TIDGET sensor sends raw GPS satellite signals to the control center for processing to determine the location of the vehicle. The primary objective of this test was to evaluate the impact of an infrastructure-based GPS system and response network on emergency response activities, time and public safety. Additionally, this test identified the necessary structure, responsibilities and service levels of a traveler assistance center necessary to commercially operate such a system.

### **Project Location :**

Central - Northeast Colorado

### **Partner(s) :**

NAVSYS Corporation, ESRI, AT&T Wireless Inc., Castle Rock Consultants, and members of the ENTERPRISE group (Departments of Transportation from the State of Arizona, Maricopa County , Colorado, Iowa, Michigan, Minnesota, North Carolina, Washington State, Dutch Ministry of Transport, Ministry of Transportation of Ontario, and Transport Canada)

### **Start Date:**

June 1995

### **End Date:**

November 1998

### **Estimated Total ITS Funds:**

\$2,439,654

### **Estimated Total Project Cost:**

\$3,832,286

### **Contacts:**

Scott Sands	FHWA Colorado Division, HDA-CO	(303) 969-6730	Ext. 362
John Kiljan	Colorado DOT	(303) 512-5858	





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## EVALUATION OF RADIO AND MICROWAVE TECHNOLOGY FOR MOTOR VEHICLE SAFETY WARNING SYSTEMS

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**Description:**

This cooperative agreement has two (2) objectives:

(1) To assist the Federal Highway Administration (FHWA) in evaluating the utility of a prototype motor vehicle safety warning system that utilizes police radar frequency transmissions to alert drivers (in real-time) of hazardous road conditions;

(2) To characterize system technical requirements for an effective warning system, and to evaluate the performance of the prototype system.

**Project Location :**

Georgia

**Contractor(s) :**

Georgia Technical Research Institute; Georgia Department of Transportation

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**Start Date:**

September 1996

**End Date:**

December 1997

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**Estimated Total  
ITS Funds:**

\$200,000

**Estimated Total  
Project Cost:**

\$200,000

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**Contacts:**

Paul Pisano

FHWA - TFHRC, HSR-30

(703) 285-2498

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## IDENTIFICATION OF SIMPLE SOLUTIONS FOR THE RURAL TRANSPORTATION SYSTEM

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**Description:**

There are four (4) tasks associated with this cooperative agreement:

- (1) An information search to identify the successful, small-scale technology applications appropriate for rural areas;
- (2) An assessment and evaluation of the most promising applications;
- (3) The documentation of these solutions and other findings;
- (4) The presentation of these findings at the appropriate venues.

Final report, Technology in Rural Transportation: Simple Solutions, has been published.

**Project Location :**

Colorado

**Contractor(s) :**

Castle Rock Consultants; Colorado Department of Transportation; Enterprise

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**Start Date:**

September 1996

**End Date:**

July 1997

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**Estimated Total  
ITS Funds:**

\$80,000

**Estimated Total  
Project Cost:**

\$80,000

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**Contacts:**

Paul Pisano

FHWA - TFHRC, HSR-30

(703) 285-2498

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## ROGUE VALLEY MOBILITY MANAGEMENT

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**Description:** This project demonstrated the Mobility Manager concept to integrate transportation users, providers, and funding sources. Advanced electronic technology was used to record financial transactions and included magnetic-stripe farecards. It included transportation service to the elderly and disabled unable to use fixed route transit.

**Project Location :** Medford, Oregon

**Partner(s) :** Call-A-Ride, Upper Rogue Community Center, Ashland Senior Program, Group Ride Service, Metro Taxi, Ashland, Cascade, White City/Cascade Cab Company, Head Start, Rogue Valley Medical Center, and Oregon DOT

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**Start Date:** September 1991

**End Date:** June 1995

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**Estimated Total  
ITS Funds:** \$380,000

**Estimated Total  
Project Cost:** \$775,900

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### Contacts:

Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195
Mary Delamare-Schaefer	Rogue Valley Council of Governments	(503) 664-6674



# TRANSCAL

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**Description:**

This project was a comprehensive Inter-Regional Traveler Information System, integrating road, traffic, transit, weather, and value-added traveler services information sources from the entire geographic region. The location of the project is along the I-80/US 50 corridor between San Francisco, California and Lake Tahoe/Reno, Nevada. Land line and cellular telephone, and wireless FM subcarrier networks were used to transport information to and from travelers via telephones, personal digital assistants, in-vehicle devices and kiosks. Additionally, the test assessed the ability to integrate information from multiple sources (urban, rural, rough terrain, severe weather, etc.), and the ability to integrate traveler services and transit information with real-time regional congestion and incident content.

**Project Location :**

California and Nevada

**Partner(s) :**

TRW/ESL, Shadow Broadcast, Cue Network Corporation, Ellen Williams and Associates, Geotechnology Development Inc., ETAK, Navigation Technologies, Sony Corporation, NET, Metropolitan Transportation Commission, Sacramento Area Council of Governments, The Tahoe Transportation District, Regional Transportation Commission of Washoe County (Nevada), California DOT (Caltrans), Nevada DOT, University of California at Davis, California Highway Patrol, Nevada Highway Patrol, Sierra Counties Consortium, and California Alliance for Advanced Transportation

Systems

**Start Date:**

July 1994

**End Date:**

December 1998

**Estimated Total  
ITS Funds:**

\$3,303,000

**Estimated Total  
Project Cost:**

\$7,355,000

**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Elaine Houmani	CalTrans	(916) 657-3957



## **IV. COMMERCIAL VEHICLE ITS INFRASTRUCTURE**

## **IV. COMMERCIAL VEHICLE ITS INFRASTRUCTURE**

The Commercial Vehicle ITS Infrastructure is based on the creation of nation-wide electronic systems and networks which enable simple, cost-effective and seamless exchanges of critical data associated with safety and administration, electronic business transactions, and commercial vehicle operations and processes. This electronic framework is known as Commercial Vehicle Information Systems and Networks (CVISN).

The elements of CVISN are summarized as follows:

- Safety assurance programs and services designed to assure the safety of commercial drivers, vehicles and cargo. These include automated roadside safety inspections and carrier reviews, safety information systems, and onboard safety monitoring.
- Credentials administration programs and services designed to improve the deskside procedures and systems for managing motor carrier regulation. These include electronic application, purchase and issuance of credentials, as well as automated tax reporting and filing.
- Electronic screening systems and services designed to facilitate the verification of size, weight, and credential information. These include the automated screening of commercial vehicles at fixed weight stations and international border crossings.
- Carrier operations activities and services designed to reduce congestion and manage the flow of commercial vehicle traffic such as travel advisory and hazardous materials incident response services. The private sector is taking the lead in implementing fleet and vehicle management technologies and systems that improve motor carrier productivity.

Under the auspices of ISTEA, the commercial vehicle applications which comprise CVISN were researched, developed and tested. Recent program efforts have centered on integrating these applications into CVISN and deploying them at pilot and model deployment sites across the Nation. This component of the ITS/CVO Program is the Model Deployment Initiative.

CVISN is not a new information system, but rather a way for existing systems to electronically exchange information through the use of standards and the commercially available communications infrastructure in the U.S. CVISN includes information systems owned and operated by state/local governments, carriers, and other stakeholders. It does not include the sensor and control elements of ITS/CVO technologies. CVISN will increase the safety and productivity of commercial operations and serve to educate key state and industry decision-makers, and the general public, on the costs and benefits of advanced technology for CVO.

The CVISN deployment strategy is divided into 5 phases. Phase 1 developed the management plans and technical frameworks necessary to coordinate the subsequent phases. Phase 2 is prototyping the technology, in a live environment, to demonstrate the operational concepts and validate the requirements. Phase 3 is the model deployment. Eight states from all regions have been funded to pilot safety, credentials and clearance services, and related technologies developed during the Prototype Phase. Phase 4 is expansion to additional states in the same regions. Phase 5 allows for full deployment of CVISN to all interested states. By this time, the technology, concepts, costs, and benefits should be well understood and documented. The end result would be deployment of the CVISN and technologies in a straightforward manner with little unforeseen risk to the public or private sector.

*Research and Development* efforts, operational tests and deployments are focused on supporting major commercial vehicle initiatives whose aim is to foster deployment of the integrated and interoperable systems which comprise CVISN. Research and development efforts focus on development of system components facilitating electronic identification and screening of vehicles and drivers. These include continuation of work on roadside identification and screening automation of the inspection process, to include pen-based computers, brake testing technologies and the development of the safety and fitness electronic records system (SAFER). Complementing efforts focus on development of on-board safety systems addressing driver fitness, vehicle diagnostics and black box development.

*Operational tests* support electronic screening to provide automated verification of properly documented trucks at weigh stations, hazardous materials management, one-stop shopping allowing computerized administration of credentials and permits, and automation of roadside safety applications which provide electronic access to carrier safety and licensing status. A major thrust of several operational tests supports the International Border Crossings Program. This program, cooperatively administered by USDOT and the Departments of Treasury and Justice, is directed at modernizing the methods for clearance of commercial vehicles at border crossings with Canada and Mexico. With the objective of facilitating safe and expeditious movement of commercial vehicles entering and exiting the United States, the agencies, in conjunction with their counterparts in Canada and Mexico, have been testing a prototype system known as the North American Trade Automation Prototype (NATAP). Those tests expand the traditional scope of CVO projects to include processes for automating verification of customs declarations for cargo clearance and the Immigration and Naturalization Service's clearance of drivers.

*Mainstreaming* is a major element of the ITS/CVO Program. The purposes of the CVO Mainstreaming program are to provide training, outreach and technical assistance to accelerate the deployment of CVISN, ITS/CVO technologies and programs. CVO includes streamlining the administration of motor carrier regulations, focusing safety enforcement activities on high-risk carriers, and reducing congestion costs for motor carriers. The objectives of the CVO Mainstreaming program are to:

- Increase the states' and carriers' technical and institutional capacity to implement CVO/CVISN;
- Incorporate ITS/CVO more fully into state and metropolitan transportation planning activities;
- Coordinate ITS/CVO activities among agencies and among states; and
- Explain the ITS/CVO program to key decision makers in the public and private sectors.



## **Safety Assurance**

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# DYNAMIC TRUCK SPEED WARNING FOR LONG DOWNGRADES

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**Description:**

This project provides for the installation of a weigh-in-motion station to determine the weight of each truck passing the site (ignoring vehicles under 30,000 pounds GVW) and for the installation of loops to determine vehicle speed. Using the weight and configuration of the vehicle, the safe descent speed is computed from the algorithm published in FHWA-RD-79-116 "Feasibility of a Grade Severity Rating System" as modified by "The Development and Evaluation of a Prototype Grade Severity Rating System." The vehicles are advised of the safe speed using variable message signs.

**Project Location :**

Colorado

**Partner(s) :**

Colorado DOT, Colorado Motor Carriers Association, and International Road Dynamics

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**Start Date:**

June 1993

**End Date:**

March 1999

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**Estimated Total ITS Funds:**

\$195,000

**Estimated Total Project Cost:**

\$243,000

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**Contacts:**

Scott Sands

FHWA Colorado Division, HDA-CO

(303) 969-6730

Ext. 362

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## ROUTE 236/I-495 NORTHERN VIRGINIA INTELLIGENT TRANSPORTATION SYSTEM

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**Description:** This project responds to a number of truck accidents at this interchange. Virginia Department of Transportation will install a truck rollover system patterned on other systems in the National Capital Region which have performed successfully.

**Project Location :** Annandale, Virginia

**Partner(s) :** Virginia DOT

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**Start Date:** October 1998

**End Date:** October 2000

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**Estimated Total  
ITS Funds:** \$500,000

**Estimated Total  
Project Cost:** \$625,000

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### Contacts:

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
James Robinson	Virginia DOT	(804) 786-6677



# **Electronic Screening**

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# AUTOMATED SAFETY ASSESSMENT PROGRAM (ASAP) PILOT ON HAZARDOUS MATERIAL CARRIERS

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**Description:**

Currently, Office of Motor Carriers (OMC) is researching new technology, known as the Automated Safety Assessment Program (ASAP), to allow electronic transmission of data from motor carriers. This technology will help to fill voids present in the Motor Carrier Management Information System (MCMIS), including additional carrier accident information not previously maintained. ASAP will enable a motor carrier to submit information electronically to OMC on its compliance with the Federal Motor Carrier Safety Regulations (FMCSRs) and Hazardous Materials Regulations (HMRs).

The ASAP program will also help speed the needed receipt of information about new motor carriers. OMC resources focus on carriers that pose the greatest risk on the highway. Studies show that new motor carriers are more likely to be involved in an accident. However, shortages in data relating to new carrier operations critically affect our ability to access these carriers' safety performance. Because OMC relies on MCMIS data to determine risk, the absence of new carrier safety data in MCMIS poses a significant problem.

The Associate Administrator for Motor Carriers has requested this pilot study. It will assess the feasibility of ASAP software, as an option to the current Hazardous Materials (HM) permitting program, as an effective means to ascertain whether a HM permit carrier can be authorized to operate in interstate transportation. Congress has supported the development of this program. OMC hopes to replace the current permit program with ASAP if the pilot is successful.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

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**Start Date:**

May 1998

**End Date:**

January 1999

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**Estimated Total ITS Funds:**

\$1,800,000

**Estimated Total Project Cost:**

\$1,800,000

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**Contacts:**

Ken Rodgers

FHWA, OMC Safety and Hazardous Materials Division, HSA-10

(202) 366-4016

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# ELECTRONIC CLEARANCE FOR INTERNATIONAL BORDERS

**Description:**

The Office of Motor Carriers is overseeing a coordinated set of operational tests whose purpose is to demonstrate commercial vehicle electronic clearance at international borders including proper identification of Mexican and Canadian motor carriers by using innovative Intelligent Transportation Systems technology. These projects comprise a comprehensive effort designed to support the development of a comprehensive North American system design and standard for international border crossings. The project sites are located at:

- \* Detroit, Michigan, and Buffalo, New York Crossings
- \* Otay Mesa, California Crossing
- \* Nogales, Arizona Crossing
- \* Laredo and El Paso, Texas Crossings

A key element of these tests is integrating the North American Trade Automation Prototype (NATAP) an initiative of the U.S. Treasury Department.

In addition, while not part of the NATAP, two additional crossings at Blaine, Washington, and Sweetgrass, Montana, were Congressionally directed to be developed for electronic clearance.

The Otay Mesa, California and Nogales, Arizona tests are complete.

**Project Location :**

The city and states enumerated above.

**Partner(s) :**

Lockheed Martin IMS, HELP Inc., Hughes TMS, PERCEPTICS, Western Highway Institute, Michigan DOT, New York DOT, Arizona DOT, California DOT CalStart, Ontario Ministry of Transportation, Sandia National Laboratory, and JHK

**Start Date:**

September 1994

**End Date:**

June 1999

**Estimated Total ITS Funds:**

\$11,640,000

**Estimated Total Project Cost:**

\$19,000,000

**Contacts:**

Lee Jackson

FHWA - OMC, HSA-20

(202) 366-4415



## ITS/CVO GREENLIGHT PROJECT

### Description:

The Oregon ITS/CVO Green Light Project will improve the safety and efficiency of commercial vehicle operations and increase the performance of the highway system. The project will electronically verify safety and weight information of drivers, vehicles, and carriers from fixed and mobile roadside sites at highway speeds. The Green Light project will be interoperable with the HELP, Inc. and ADVANTAGE I-75 electronic clearance efforts to form the national deployment of an electronic information network for commercial vehicles and States.

The primary features of this effort are to:

- deploy mainline electronic pre-clearance sites;
- deploy integrated tactical enforcement sites;
- create safety enhancements including electronic access to driver/vehicle/carrier safety Status, downhill speed control notification systems, and road/weather conditions;
- integrate vision technology for vehicles not equipped with transponders
- provide hardware/software upgrades and database management and
- development to support the project;
- and perform an independent objective evaluation of the project.

**Project Location :** Oregon

**Partner(s) :** Oregon DOT and Oregon State University; Iowa State University; Walton & Associates

**Start Date:** March 1995

**End Date:** June 2000

**Estimated Total ITS Funds:** \$20,000,000

**Estimated Total Project Cost:** \$25,500,000

### Contacts:

Zeborah English	FHWA - OMC, HSA-20	(202) 366-0398
Jeff Loftus	FHWA - OMC, HSA-20	(202) 366-4516
Mike Nolan	FHWA - HMC-OR	(503) 399-5775
Joel Hiatt	FHWA - OMC, HMC-WA	(360) 753-9875
Ken Everet	Oregon DOT	(503) 945-7938
Paul Henry	Oregon Public Utilities Commission	(503) 378-6736



## OUT-OF-SERVICE VERIFICATION OPERATIONAL TESTS

**Description:**

Two operational tests are currently underway that will utilize technologies that will provide automatic, real-time out-of-service verification at the roadside. The Wisconsin/Minnesota project will utilize video identification equipment and a database which would be created containing key out-of-service data on specific vehicles. Subsequent downstream identification of vehicles will determine whether or not a vehicle is in violation of an out-of-service order. The Idaho project will utilize AVI tags, video imaging analysis and an inspection site alarm system that would be activated when an out-of-service vehicle attempts to leave. The Minnesota/Wisconsin test is completed. The completion data below applies to the Idaho test.

**Project Location :**

Minnesota/Wisconsin and Idaho

**Partner(s) :**

Minnesota Department of Public Safety, Minnesota DOT, Wisconsin DOT, Wisconsin Division of State Patrol, Idaho Department of Law Enforcement, Idaho National Energy Laboratory, Hughes Missile Systems Company

**Start Date:**

April 1994

**End Date:**

January 1999

**Estimated Total ITS Funds:**

\$1,016,000

**Estimated Total Project Cost:**

\$1,400,000

**Contacts:**

Steve Keppler	FHWA - OMC, HSA-20	(202) 366-2978
Lt. Tim Carnahan	Wisconsin State Patrol	(608) 266-0264
Saundra DeClotz	Idaho State Police	(208) 884-7220





# COUTTS/SWEET GRASS AUTOMATED BORDER CROSSING PROPOSAL

## **Description:**

This project will pursue the development and deployment of ITS applications to expedite the movement of commercial motor carrier traffic back and forth across the U.S./Canadian border at the Coutts/Sweet Grass crossing. The Montana and Alberta jurisdictions involved in the project are pursuing the development and deployment of a “seamless” international border crossing. The resulting technology-based environment is intended to improve on the cooperation, operations and regulatory process which currently exists.

This project is just one of a number of other larger improvement projects which are also proceeding to address the entire border crossing facility. The overall objectives of this initial ITS project are to (1) develop weigh station criteria that are acceptable to both agencies in addressing safety, credential and fuel issues; (2) establish a database of commercial carriers who agree voluntarily to abide by the developed criteria; (3) install weigh-in-motion (WIM) systems that assure size and weight compliance among carriers; and (4) evaluate the success of the system.

**Project Location :** Coutts, Alberta and Sweetgrass, Montana

**Partner(s) :** Western Transportation Institute, Montana Department of Transportation, Alberta, Canada

**Start Date:** May 1997

**End Date:** June 2000

**Estimated Total  
ITS Funds:** \$500,000

**Estimated Total  
Project Cost:** \$625,000

## **Contacts:**

Bob Seliskar	FHWA Montana Division, HDA-MT	(406) 449-5310	Ext. 244
Dennis Hult	Montana DOT	(406) 444-9237	
Steve Albert	Western Transportation Institute	(406) 994-6114	



# **Carrier Operations**

# NATIONAL INSTITUTE FOR ENVIRONMENTAL RENEWAL (NIER)

**Description:**

This project is designed to demonstrate the feasibility of utilizing computerized emergency response information, including telecommunications technologies, to provide hazardous materials information to emergency response units.

Phase I objectives are to:

- Identify contents of shipments of hazardous materials transported by motor carriers, and
- Link systems that identify, store and allow retrieval of data for emergency response to incidents and accidents involving transportation of hazardous materials by motor carriers either directly or through links with other systems.

Phase I is complete.

During Phase II, the project has been expanded to include the OPERATION RESPOND System and intermodal movements at the port of Los Angeles.

**Project Location :**

Phase I, Mayfield, Pennsylvania: Phase II, Port of Los Angeles, California

**Partner(s) :**

NIER and various subcontractors

**Start Date:**

September 1996

**End Date:**

March 2000

**Estimated Total ITS Funds:**

\$4,000,000

**Estimated Total Project Cost:**

\$4,000,000

**Contacts:**

Lee Jackson	FHWA-OMC, HSA-20	(202)366-4415
Robert Ketenheim	FHWA - OMC, Region 3	(410) 962-0098



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## OPERATION RESPOND

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**Description:**

This project is designed to provide an electronic link with 911 operators and participating carriers during the initial response to hazardous materials accidents. The project is currently being expanded to establish computerized information systems for emergency responders and participating railroads and motor carriers serving Mexican and Canadian border crossings. The crucial information provided by this innovative system will enable emergency responders to have real-time access to hazardous materials information on the scene across North America to facilitate assessment of situations and to determine appropriate immediate action. This will further ensure the safety of the public and emergency personnel.

**Project Location :**

Houston, Texas; Atlanta, Georgia; New Orleans, Louisiana Nuevo Laredo, Mexico; Laredo, Texas; Contra Costa County, California; Buffalo, New York; Niagara Falls, Detroit, Michigan; Canada and other locations to be determined.

**Partner(s) :**

Operation Respond Institute, Inc.

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**Start Date:**

January 1997

**End Date:**

August 1999

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**Estimated Total  
ITS Funds:**

\$1,540,000

**Estimated Total  
Project Cost:**

\$3,015,000

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**Contacts:**

Lee Jackson

FHWA - OMC, HSA-20

(202) 366-4415

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# **Integrated System**

# CVISN - MODEL DEPLOYMENT (COMMERCIAL VEHICLE INFORMATION SYSTEMS & NETWORKS)

## **Description:**

The model deployment of CVISN is focused on safety information exchange, roadside electronic screening, and credentials administration. Safety Information Exchange provides carrier, vehicle and driver safety information to roadside enforcement personnel and other authorized users. Roadside electronic screening provides for screening vehicles that pass a roadside check station, determining whether further inspection or verification of credentials is required, and taking appropriate actions. Vehicle-to-roadside communications via transponders and readers/writers facilitate the screening functions at mainline speed. Weigh-in-Motion provide for high speed, mainline weighing. Credentials Administration provides for electronic application, processing, fee collection, issuance and distribution of CVO credentials, support of base State agreements and provides for CVO tax filing/auditing.

Status - The model deployment states have completed their CVISN project plans. These plans define the overall approach to the CVISN project, including establishing project objectives, work elements and responsible organizations/individuals, allocation of resources, budget, and schedule/milestones.

## **Project Location :**

Kentucky, Connecticut, Michigan, Colorado, Minnesota, California, Washington, Oregon

## **Partner(s) :**

Departments of Transportation in participating states

## **Start Date:**

October 1996

## **End Date:**

September 1999

## **Estimated Total ITS Funds:**

\$7,300,000

## **Estimated Total Project Cost:**

\$20,000,000

## **Contacts:**

Doug McKelvey	FHWA-OMC-HSA-20	(202) 366-0950
Jeff Secrist	FHWA-OMC-HSA-20	(202) 366-2963



## **Completed Projects**

## ADVANTAGE CVO

### Description:

Advantage CVO, formerly Advantage I-75, represents a multi-state partnership of public and private sector interests along the I-75 corridor. The project facilitated motor-carrier operations by allowing transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 at mainline speeds with minimal stopping at weigh/inspection stations. Electronic clearance decisions at downstream stations were based on truck size and weight measurements taken upstream and on computerized checking of operating credentials in each state. Advantage I-75 features the application of transponder technology and decentralized control, with each state retaining its constitutional and statutory authority relative to motor carriers and their operations. Four thousand trucks participated in the project. Federal ITS funds ended in September 1997. The participating States are continuing and are proposing to expand to 20,000 trucks.

### Project Location :

I-75 in Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan and Ontario

### Partner(s) :

Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan, Ontario (Canada), Motor Carrier Industry, American Trucking Associations, National Private Truck Council, United Parcel Service, SAIC, Hughes, and University of Kentucky

### Start Date:

January 1991

### End Date:

December 1998

### Estimated Total ITS Funds:

\$8,400,000

### Estimated Total Project Cost:

\$17,532,308

### Contacts:

Doug McKelvey	FHWA - OMC, HSA-20	(202) 366-0950
Glennon Musial	FHWA - OMC, HMC-04	(404) 562-3600
Joe Crabtree	Kentucky Transportation Center	(606) 257-4513





# ASSESSMENT OF STATE BENEFITS AND COSTS FROM ITS/CVO SERVICES

## **Description:**

The purpose of this study was to assess the benefits and costs of Intelligent Transportation Systems/Commercial Vehicle Operations (ITS/CVO) technology applications for States nationwide. This project had two distinct phases. Phase 1 consisted of the development of an education tool for Governors that will provide a policy analysis of ITS activities at the Federal level and the implications on transportation systems in their States. Phase 2 consisted of an in-depth economic assessment of the costs and benefits of ITS/CVO technology applications from a State perspective. In addition to this economic assessment, State business plans for the deployment and operation and maintenance of the ITS/CVO applications were also developed. The Governors of the United States, Territories and Commonwealths of America have worked through the National Governors' Association (NGA) to deal collectively with issues of public policy and governance. The NGA's ongoing mission is to support the work of the Governors by providing a bipartisan forum to help shape and implement national policy and to solve State problems. The Center for Policy Research is the research and development arm of the NGA. The center is a vehicle for sharing knowledge about innovative State activities, exploring the impact of Federal initiative on State government, and providing technical assistance to States. The Center works in a number of policy fields, including economic development, information management, and transportation. The priorities for the NGA's research are set by the Governors.

**Project Location :** Various

**Contractor(s):** Iowa DOT and Nevada DOT

**Start Date:** September 1995

**End Date:** July 1997

**Estimated Total ITS Funds:** \$519,859

**Estimated Total Project Cost:** \$519,859

## **Contacts:**

Jeff Loftus	FHWA - OMC, HSA-20	(202) 366-4516
Milan Krukar	Oregon DOT	(202) 624-7740



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## AUTOMATED SAFETY ASSESSMENT PROGRAM

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**Description:**

The primary objective of the Automated Safety Assessment Program (ASAP) was to obtain data from the motor carrier that will enable the Office of Motor Carriers (OMC) to detect the motor carrier's safety performance without going to the carrier's place of business at a significant cost in time and money. The ASAP program allows motor carriers to present information, through an electronic means, to the OMC regarding their compliance with the Federal Motor Carrier Safety Regulations. The ASAP program consists of menu-driven software that will be provided to eligible motor carriers. The motor carriers would load the software into microcomputer systems and complete a data input process. The data would be downloaded to the Office of Motor Carriers for validation and analysis.

**Project Location :**

Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

**Start Date:**

May 1995

**End Date:**

October 1998

**Estimated Total  
ITS Funds:**

\$1,500,000

**Estimated Total  
Project Cost:**

\$1,500,000

**Contacts:**

Ken Rodgers	FHWA - OMC, HSA-10	(202) 366-4016
Cynthia Mitchell	Volpe Center	(617) 494-2271



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## BLACK BOX DEVELOPMENT

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**Description:**

This project was designed to address the feasibility of placing a vehicle incident recorder on commercial vehicles for accident reconstruction. The contractor evaluated which vehicle functions need to be monitored and showed how these functions could be used in accident reconstruction.

**Project Location :**

New Mexico

**Contractor(s) :**

Sandia National Laboratory

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**Start Date:**

August 1995

**End Date:**

March 1997

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**Estimated Total  
ITS Funds:**

\$750,000

**Estimated Total  
Project Cost:**

\$750,000

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**Contacts:**

Kate Hartman

FHWA - OMC, HSA-20

(202) 366-2742

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# COMMERCIAL VEHICLE CREDENTIAL SYSTEM ARCHITECTURE

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**Description:**

This study designed a national CVO information system architecture that provides all authorized users on-line access to Registration, Fuel Tax and Safety Information. Further it coordinated numerous national information system development efforts underway in response to congressional legislation and user requirements. This project was an umbrella for the following projects:

1. Commercial Vehicle Fleet Management and Information Systems
2. Systems Planning for Automatic Commercial Vehicle Licensing and Permitting Systems

**Project Location :**

Laurel, Maryland

**Contractor(s) :**

Johns Hopkins University's Applied Physics Laboratory

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**Start Date:**

February 1994

**End Date:**

September 1995

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**Estimated Total  
ITS Funds:**

\$2,660,000

**Estimated Total  
Project Cost:**

\$2,660,000

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**Contacts:**

Mike Onder	USDOT ITS JPO, HVH-1	(202) 366-2639
Michael Curtis	FHWA - TFHRC, HSR 10	(703) 285-2991

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## COMMERCIAL VEHICLE FLEET MANAGEMENT AND INFORMATION SYSTEMS

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**Description:** Commercial and public fleet management problems and needs that might be addressed through advanced technologies have been identified through case studies and in-depth interviews with fleet managers, dispatchers, and drivers. Phase II studied the application of ITS to intermodal freight movement.

**Project Location :** Cambridge, Massachusetts

**Contractor(s) :** Cambridge Systematics, Inc.

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**Start Date:** September 1993

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$405,461

**Estimated Total  
Project Cost:** \$405,461

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### Contacts:

Gene McHale

FHWA - TFHRC, HSR-10

(703) 285-2973

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# CVISN - DESIGN OF A COMMERCIAL VEHICLE INFORMATION SYSTEM NETWORK

## **Description:**

FHWA is currently designing, testing, and evaluating ITS technology to provide automated clearance, electronic credential purchasing, and automated roadside safety information processing for interstate and intrastate Commercial Vehicle Operations (CVO). Currently commercial vehicles are stopped at state borders and checked for size and weight violations. While these are necessary checks, they cause millions of dollars in lost productivity.

An information system is required to allow commercial vehicles to be cleared as they pass at highway speeds. Also, commercial vehicle operators must spend time and effort gathering appropriate credentials (permits) from each state and agency they do business with. Electronic purchasing of credentials and permits would reduce the administrative burden on carriers significantly and help to streamline the states' process of issuing credentials. Additionally, to facilitate the decision process regarding high-risk carriers, the intent is to provide real-time safety data. A national information systems architecture is being designed to support various scenarios. Models of the system have been developed to evaluate those alternatives that best support user services. Subsequently, the system will provide the design for a national CVO information system network. Testing is occurring in two (2) prototype states and eight (8) pilot states.

**Project Location :** Laurel, Maryland

**Contractor(s) :** Johns Hopkins University's Applied Physics Laboratory/RSISS

**Start Date:** August 1995

**End Date:** August 1998

**Estimated Total  
ITS Funds:** \$10,500,000

**Estimated Total  
Project Cost:** \$10,500,000

## **Contacts:**

Doug McKelvey	FHWA-ITS/CVO, HSA-20	(202) 366-9246
Michael Curtis	FHWA - TFHRC, HSR-10	(703) 285-2991



## DEVELOPMENT, EVALUATION, AND APPLICATION OF BRAKE TESTING DEVICES-BATTELLE MEMORIAL INSTITUTE

### **Description:**

The Office of Motor Carriers has contracted with Battelle Memorial Institute to evaluate and test devices that show substantial promise of increasing the efficiency of roadside inspections. Several State inspection/enforcement agencies are testing a variety of brake devices in conjunction with Commercial Vehicle Safety Alliance Level 1 brake inspections on commercial vehicles (heavy trucks and buses). These joint inspections, combined with daily use, training, and maintenance records, provide data from which an objective evaluation of the technologies can be made. The project assessed a variety of technologies including roller dynamometers, flat-plate testers, infra-red detectors, torsional devices, and decelerometers.

### **Project Location :**

Ohio, West Virginia, Colorado, Connecticut, Indiana, Oregon, Wisconsin, Nevada, Maryland, and Ontario, Canada

### **Contractor(s) :**

Battelle Memorial Institute

### **Start Date:**

September 1993

### **End Date:**

September 1998

### **Estimated Total ITS Funds:**

\$1,076,264

### **Estimated Total Project Cost:**

\$3,075,000

### **Contacts:**

Steve Keppler	FHWA - OMC, HSA-20	(202) 366-2978
Dr. Steve Shaffer	Battelle Memorial Institute	(614) 424-4960



## ELECTRONIC ONE-STOP SHOPPING OPERATIONAL TESTS

### **Description:**

The HELP, Inc., Midwest States, and SW States Electronic One-Stop Shopping Operational Tests are comprised of 14 states. The projects tested different approaches to one-stop, multi-state electronic purchase of credentials from locations such as motor carrier facilities, permitting services, truck stops and state agencies. The carriers were able to purchase registration, fuel tax, authority, and over-dimensional permits from participating states through the systems. Credentials could be delivered electronically to the requesting location or to a location specified by the carrier. The carriers would electronically request and pay for credentials through their base state or individual states. The primary objective of these tests was to evaluate improvements in state and motor carrier productivity from a one-stop electronic system which will make it possible for a motor carrier to apply for, pay for, and receive all necessary credentials or permits electronically either from the base or individual states.

### **Project Location :**

HELP Inc.: CA, AZ, NM; Midwest: IA, MN, NE, WI, KS, MO, IL, SD; Southwest: CO, NM, AR, TX

### **Partner(s) :**

Various, HELP Inc, State Agencies in participating states, Lockheed-Martin, In-Motion, RSIS; 50 private motor carriers

### **Start Date:**

January 1995

### **End Date:**

September 1997

### **Estimated Total ITS Funds:**

\$4,525,937

### **Estimated Total Project Cost:**

\$7,874,856

### **Contacts:**

Jeff Loftus	FHWA - OMC, HSA-20	(202) 366-4516	
Alan Brown	FHWA - OMC, Region 8 (SW Test)	(303) 969-6744	Ext. 358
John Cartin	FHWA - OMC, Region 7 (MW Test)	(816) 276-2760	
Jeff Kolb	FHWA Region 8, HPD-08 (SW Test)	(303) 969-5772	Ext. 341
Mike Nighbert	FHWA - OMC, Region 5 (MW Test)	(708) 283-3577	
Susan Seckler	FHWA - OMC, Region 9; (HELP Inc., Test)	(415) 744-3088	





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## INTER-REGIONAL INSTITUTIONAL STUDY PROJECT

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**Description:** This study contributed to the establishment of uniformity in truck weights enforcement and the creation of a uniform, single registration form for all port reporting states.

**Project Location :** Georgia

**Contractor(s) :** Georgia DOT

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**Start Date:** September 1994

**End Date:** December 1998

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**Estimated Total  
ITS Funds:** \$575,000

**Estimated Total  
Project Cost:** \$1,150,000

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### Contacts:

Jeff Loftus	FHWA - OMC, HSA-20	(202) 366-4516
Glennon Musial	FHWA - OMC, HMC-04	(404) 347-4049
Mark Doctor	FHWA Region 4, HES-04	(404) 347-4075



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## ITS/CVO COMMUNICATIONS-OUTREACH PLAN

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**Description:**

The ITS/CVO Communications-Outreach Plan, designed and oversaw development and production of the necessary communications tools to assure that the ITS/CVO program is fully communicated to selected audiences. Major areas of emphasis included:

- I. Communications
  - Product dissemination plan
  - ITS/CVO promotional, educational and presentation materials
  - Bi-lingual education, presentation materials
  - Portable ITS/CVO exhibit displays
  - National Listening Session
  - Media Relations strategy and campaign
  - National database for ITS/CVO technology information
  
- II. Outreach
  - National Focus Groups Meetings
  - ITS/CVO Training Course

Additionally, the Coordinator planned, and oversaw development of a variety of outreach activities designed to educate and inform selected audiences while gaining support and participation in the ITS/CVO program.

**Project Location :** Various

**Partner(s) :** DRI - Walcoff & Associates, Transportation Safety Institute, and CVSA

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**Start Date:** September 1995

**End Date:** September 1996

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**Estimated Total  
ITS Funds:** \$380,000

**Estimated Total  
Project Cost:** \$380,000

**Contacts:**

Zeborah English

FHWA - OMC, HSA-20

(202) 366-0398



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## ITS/CVO LEGAL & PRIVACY STUDY

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**Description:** This cooperative agreement initiated a literature review and contacted various members of the ITS/CVO community, industry representatives, transportation experts and legal/privacy act experts to identify key issues relating to ITS/CVO.

**Project Location :** Durham, North Carolina

**Contractor(s) :** North Carolina Central University

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**Start Date:** October 1996

**End Date:** January 1998

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**Estimated Total  
ITS Funds:** \$77,000

**Estimated Total  
Project Cost:** \$77,000

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### Contacts:

Kate Hartman	FHWA-OMC, HSA-20	(202) 366-2742
Dean Percy Luney, Jr.	North Carolina Central Univ. School of Law	(919) 560-6427



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## ON-BOARD BRAKE RESEARCH AND TESTING

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**Description:** FHWA and NHTSA entered into a reimbursable agreement to develop and evaluate prototype electronic braking systems. These systems potentially offer many advantages compared to pneumatically-controlled systems in terms of reliability, safety, efficiency, and productivity. This multi-year effort developed functional and performance specifications for electronic braking systems that will enable them to act as status monitors and recorders.

**Project Location :** Winston-Salem, North Carolina

**Contractor(s) :** Various vehicle/electronic manufacturers

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**Start Date:** October 1995

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$500,000

**Estimated Total  
Project Cost:** \$500,000

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### Contacts:

Steve Keppler

FHWA - OMC, HSA-20

(202) 366-2978

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## ON-BOARD DRIVER MONITORING/FITNESS-FOR-DUTY TESTING

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**Description:**

This pilot test evaluated the ability of a lane tracking device to monitor a driver's fitness-for-duty. Drivers using this device establish a "base" for their ability to keep a vehicle in its lane. If deviation is detected, the driver is notified. If it continues, both the driver and the carrier are notified. The driver then stops the vehicle at the closest safe location and takes a five minute test. Depending on the test results, the driver may continue driving or may be required to sleep before resuming driving responsibilities.

**Project Location :**

San Diego, California

**Contractor(s) :**

Trucking Research Institution; Trucking Research Institute and Evaluation Systems, Inc.

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**Start Date:**

June 1995

**End Date:**

October 1998

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**Estimated Total  
ITS Funds:**

\$628,000

**Estimated Total  
Project Cost:**

\$628,000

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**Contacts:**

Bill Rogers

Trucking Research Institute

(703) 838-7912

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## PASS

**Description:**

PASS (Port-of-Entry Advanced Sorting System) was a test of mainline sorting at Oregon's Ashland Port-of-Entry on northbound I-5. The project examined integrating Automatic Vehicle Identification (AVI), Weigh In Motion (WIM) and Automated Vehicle Classifications (AVC) to identify, weigh, classify and direct selected heavy vehicles in advance of weigh stations and ports-of-entry. Legally operating trucks participating in the project were directed, by the use of an in-vehicle device, to bypass the port and the static scale weighing process, resulting in time savings for both the carrier and the port personnel.

**Project Location :**

Ashland Port of Entry, Northbound I-5

**Partner(s) :**

Oregon DOT and Motor Carrier Industry

**Start Date:**

July 1992

**End Date:**

December 1996

**Estimated Total  
ITS Funds:**

\$350,000

**Estimated Total  
Project Cost:**

\$552,000

**Contacts:**

Mike Nolan	FHWA-OMC-OR ITS/CVO	(503) 399-5775	Ext. 325
Milan Krukar	Oregon DOT	(503) 378-4082	
Ken Everet	Oregon DOT	(503) 378-6054	



## ROADSIDE MCSAP COMPUTER SYSTEM (200 SITES)

### **Description:**

This Congressionally mandated project had the goal of providing by December 31, 1995, carrier safety data and driver license status to the roadside for at least 100 MCSAP inspection sites; and by mid-1997, the additional capability to access this data electronically via communications from at least 200 MCSAP sites. This project uses information systems technology to better target inspections, improve driver license checks, and provide for electronic recording and uploading of inspection data via portable computers.

The project encompasses the following projects:

- Development of a functional vehicle driver inspection system (ASPEN)
- Evolution of roadside data communications options (SAFER)
- Development of Inspection Selection System (ISS)

Status - A first generation ASPEN inspection system (for DOS) was deployed in 1995 in 25 States. It was replaced in 1996 by a second generation ASPEN written for Windows. This version currently is deployed in 45 States and is in use by approximately 2,000 law enforcement officers. The pen-computer strategy has given way to a laptop computer strategy because of limitations in pen-computer hardware technology. Widespread use of ASPEN greatly has improved inspection accuracy, inspection report readability, and timeliness of data transfer into the National information system. A third generation rebuild of ASPEN into a 32-bit system for WindowsNT is slated for 1998.

The Inspection Selection System (ISS) was developed and deployed in 45 States with great success. Societal benefits have been calculated to exceed \$60 million per year (see final ISS report). A version of ISS for voice input has been developed and is being tested. To tie ISS closely with OMC's SAFESTAT carrier prioritization algorithm, a second generation ISS, based closely on SAFESTAT, currently is under development.

The SAFER communications system is a many-faceted project and is still under development. Currently, functional parts include:

- Inspection transfer via a data mailbox system
- Unknown carrier name & address and "snapshot" lookup
- Weekly refresh of local ISS carrier snapshot databases
- Carrier information availability via the Internet

The next major addition to SAFER is implementation of a 30-day past inspection database, and query retrieval system. This is expected to be operational by early Spring 1998 with release of ASPEN version 1.4.

Widespread deployment of SAFER to State users has proved to be more complex than originally anticipated. Currently, SAFER use is limited to beta testing with about 30 users in three States (CT, DE, NY). In the coming months we expect SAFER to be deployed in MD, VA, PA, NJ, RI, WV, WA, and NE. Additional States will follow quickly after that. We anticipate 200 State SAFER/ASPEN 1.3 users by January 1998 and over 1,000 by the end of 1998.

**Project Location :** 45 States

**Partner(s) :** 32 States, MCSAP Funds



**Start Date:** September 1995

**End Date:** January 1998

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**Estimated Total  
ITS Funds:** \$2,000,000

**Estimated Total  
Project Cost:** \$3,600,000

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**Contacts:**

Tom Hillegass

FHWA - OMC, HIA-10

(202) 366-4023

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## SAFETY AND FITNESS ELECTRONIC RECORDS SYSTEM (SAFER)

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**Description:** SAFER system provides electronic records of carrier safety fitness to ITS/CVO and enables carrier safety fitness data to be accessed by roadside inspectors at 100 MCSAP sites.

**Project Location :** Baltimore, Maryland

**Contractor(s) :** Johns Hopkins University's Applied Physics Laboratory

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**Start Date:** January 1994

**End Date:** June 1998

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**Estimated Total  
ITS Funds:** \$5,850,000

**Estimated Total  
Project Cost:** \$5,850,000

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### Contacts:

Tom Hillegass

FHWA - OMC, HIA-10

(202) 366-4023

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## SMART CARD DEVELOPMENT

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**Description:**

The smart card project developed three smart card prototypes: (1) Smart CDL; (2) Smart Cargo Manifest; and (3) Smart Vehicle Card. These cards were developed and tested to determine what type or combination of types (i.e., bar code, magnetic stripe, computer chip) of technology these cards should employ in order to provide real-time safety data and reduce the paperwork burden for the carrier(s) and driver(s).

**Project Location :** Woodbridge, Virginia

**Contractor(s):** 3-G International

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**Start Date:** September 1995

**End Date:** December 1996

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**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$1,000,000

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**Contacts:**

Kate Hartman

FHWA - OMC, HSA-20

(202) 366-2742

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# SYSTEMS PLANNING FOR AUTOMATED COMMERCIAL VEHICLE LICENSING AND PERMITTING SYSTEMS

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**Description:**

The objective of this study was to develop a systems plan for the development of various automated licensing and permit compliance and verification systems. This study included all the necessary activities leading up to the actual hardware and software design for such systems. The study did not include any actual system design or testing efforts.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Cambridge Systematics, Inc.

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**Start Date:**

June 1992

**End Date:**

February 1997

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**Estimated Total  
ITS Funds:**

\$618,000

**Estimated Total  
Project Cost:**

\$625,000

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**Contacts:**

Michael Freitas

FHWA - TFHRC, HSR-10

(703) 285-2421

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## **V. INTELLIGENT VEHICLE INITIATIVE (IVI)**

## **V. INTELLIGENT VEHICLE INITIATIVE (IVI)**

Motor vehicle crashes cause significant personal, social and economic costs imposed on our society. These costs are manifested in terms of fatalities, injuries and economic impacts resulting from emergency and health care, property damage, highway congestion, insurance claims and reduced productivity. During the past two decades, motor vehicle collisions accounted for over 90 percent of all transportation fatalities. In excess of 40,000 motor vehicle fatalities per year contribute to an estimated annual economic loss to U.S. society of \$150 billion.

Driver error has been identified as the principal cause of about 90 percent of crashes involving passenger vehicles, trucks and buses reported by police. New technologies are emerging which can improve the safety and efficiency of driver performance. These technologies provide collision avoidance capabilities complemented by driver assistance and motorist information.

During the period of ISTEA authorization, U.S. DOT had established multiple research and development programs establishing an extensive knowledge base in collision avoidance, automated highways and driver-vehicle interface. This research was conducted under the auspices of the Advanced Vehicle Control and Safety Systems program led by the National Highway Traffic Safety Administration and the Automated Highway System Program led by the National Automated Highway System Consortium. Building on this success, the Department has consolidated ITS vehicle-related programs under a single Intelligent Vehicle Initiative (IVI) with a strong human factors emphasis. The unified approach will be directed toward reaping the benefits of close coordination and program integration.

The Department will conduct the Intelligent Vehicle Program in cooperation with the motor vehicle, trucking and bus industries, state and local governments and other stakeholders. Through this program, the Department seeks to facilitate the development, evaluation and deployment of vehicle-related safety and mobility enhancing systems in order to accelerate their market availability in the interests of public safety and improved driving efficiency.

The Department has identified three levels of vehicle capability for testing and development summarized as follows:

- The first-level system will provide warning and information services that enhance the driver's ability to sense what is going on in the surrounding environment and expand the driver's knowledge of routes and locations. Technologies include collision notification systems, in-vehicle signing, and navigational/route guidance systems.
- The second-level system will provide driver assistance, including limited control assistance and alternative technologies to reduce cost or improve performance. Technologies include rear-end collision avoidance possibly integrated with intelligent cruise control, steering assistance, and vehicle-infrastructure communications.

- The third level will provide more sophisticated vehicle/infrastructure and vehicle/vehicle commands to enhance driver performance. Technologies include lateral and longitudinal collision avoidance and fully cooperative real-time vehicle-to-vehicle and vehicle-to-infrastructure information and control systems.

Each of these levels integrates additional technologies that achieve incremental evolutions from autonomous safety and mobility capabilities to cooperative vehicle-infrastructure systems. In early stages of the program, the Department will focus on field operational testing of both warning and information systems as well as driver assistance.

While the Intelligent Vehicle Initiative is still principally a research effort, planning calls for operational testing of the first testbed in the next few years. Vehicles included in program planning include light vehicles (passenger car, minivans), commercial vehicles, transit vehicles and emergency/specialty vehicles ranging from snowplows to police vehicles.

Documentation available to describe program initiatives, establish programmatic goals and stimulate discussion include:

- Preliminary Business Plan
- Listing of candidate user services
- Preliminary IVI roadmap

# **Driver Assistance – Safety Systems**

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# ADVANCED VEHICLE CONTROL SYSTEMS INFRASTRUCTURE AND TRAFFIC IMPACTS

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**Description:**

Several types of Advanced Vehicle Control Systems (AVCS) are being studied by NHTSA, including run-off-the-road warning/avoidance and intersection collision warning/avoidance systems. This major research effort was expected to surface numerous issues concerning infrastructure interactions with these types of vehicle control systems. In many cases, system concept feasibility is dependent on the affected infrastructure elements. This project addresses infrastructure-related issues in close coordination with NHTSA. Concurrently, these control systems were conceptualized and existing concepts evaluated to optimize traffic flow. The contracts are structured to conduct work on a task order basis; individual tasks are generated based on the status of ongoing AVCS efforts. Final documentation will be available on completion date.

**Project Location :** Falls Church, Virginia

**Contractor(s) :** E-Systems

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**Start Date:** May 1994

**End Date:** February 1999

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**Estimated Total ITS Funds:** \$730,634

**Estimated Total Project Cost:** \$1,210,596

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**Contacts:**

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680

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# ANALYTICAL SUPPORT/ANALYSIS OF ACCIDENT AND DRIVER PERFORMANCE DATABASES

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**Description:**

This project addresses target crash problem size assessment and statistical descriptions. The goals of this project are: (1) analyze existing NHTSA and state accident databases to determine vehicle, driver, and environmental contributing factors (and their interactions) and characteristics of target crashes of conventional and ITS crash avoidance countermeasures, and (2) assess the effects of existing vehicle design features on the incidence and severity of crashes in the "real world."

**Project Location :**

Washington, DC

**Contractor(s) :**

Information Management Consultants, Inc. (IMC)

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**Start Date:**

May 1990

**End Date:**

September 1999

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**Estimated Total  
ITS Funds:**

\$75,000

**Estimated Total  
Project Cost:**

\$75,000

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**Contacts:**

Duane Perrin

NHTSA Headquarters, NRD-53

(202) 366-5654

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# AUTOMOTIVE COLLISION AVOIDANCE SYSTEM DEVELOPMENT

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**Description:**

The purpose of this project is to provide a highly focused effort to accelerate the deployment of near-term collision warning systems. Secondary goals are to advance the development of promising, but immature technologies and to reduce manufacturing costs of key system components. This project is funded by The Defense Advanced Research Projects Agency and administered by NHTSA as a cooperative agreement with several leading automotive industry and academic research organizations.

**Project Location :**

Kokomo, Indiana

**Contractor(s) :**

Delco Electronics

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**Start Date:**

January 1995

**End Date:**

January 1999

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**Estimated Total  
ITS Funds:**

\$6,116,000

**Estimated Total  
Project Cost:**

\$13,034,000

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## CRASH AVOIDANCE METRICS PARTNERSHIP (CAMP) - REAR-END COLLISION WARNING RESEARCH, TEST METRICS AND TEST METHODOLOGY DEVELOPMENT PROGRAM

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**Description:**

The focus of this effort is to conduct research activities jointly with industry to investigate vehicle-borne systems which address rear-end collisions. The goal of this project is to define and develop pre-competitive enabling elements of rear-end collision warning systems by establishing common analytical methods, performance metrics, test procedures, databases, function definitions, and minimum performance specifications for these systems.

**Project Location :**

Michigan

**Contractor(s) :**

General Motors and Ford Motor Company

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**Start Date:**

February 1996

**End Date:**

April 1999

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**Estimated Total  
ITS Funds:**

\$1,797,757

**Estimated Total  
Project Cost:**

\$3,595,569

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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# DEVELOPMENT AND EVALUATION OF THE DRIVER INTERFACE FOR A REAR OBJECT WARNING SYSTEM

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**Description:** This project is developing and evaluating a prototype back up warning system driver interface based on the preliminary recommendations of recent COMSIS, Inc. research. The prototype will be used to evaluate the usability of recommended warning criteria and interface displays.

**Project Location :** Silver Spring, Maryland

**Contractor(s) :** WESTAT

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**Start Date:** September 1996

**End Date:** May 1999

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**Estimated Total ITS Funds:** \$261,800

**Estimated Total Project Cost:** \$261,800

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## Contacts:

Michael Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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## DEVELOPMENT, EVALUATION, AND DEPLOYMENT OF FORWARD CRASH AVOIDANCE SYSTEMS (FOCAS)

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**Description:** This project will investigate how the functions provided by an Automatic Intelligent Cruise Control (AICC) system can be extended to produce a rear-end collision avoidance system. A prototype AICC system developed by Leica to demonstrate its infrared sensor technology has been installed in a Saab 9000 which will serve as the development testbed.

**Project Location :** Michigan

**Contractor(s) :** University of Michigan Transportation Research Institute (UMTRI)

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**Start Date:** May 1994

**End Date:** June 1999

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**Estimated Total ITS Funds:** \$1,499,741

**Estimated Total Project Cost:** \$2,550,288

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### Contacts:

Art Carter

NHTSA Headquarters, NRD-51

(202) 366-5669

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# HUMAN FACTORS STUDIES FOR THE EVALUATION, ANALYSIS, AND OPERATIONAL ASSESSMENT OF AN INTELLIGENT CRUISE CONTROL SYSTEM

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**Description:** This program will address a range of human factors issues associated with implementation of Intelligent Cruise Control (ICC) systems. These issues include: (1) driver usability in terms of ease of learning ICC operation; (2) driver reaction to the ICC limits, for maximum deceleration and acceleration and minimum headway; (3) driver attention and response to braking situations.

**Project Location :** Dearborn, Michigan

**Contractor(s) :** Ford Motor Company

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**Start Date:** September 1994

**End Date:** June 1999

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**Estimated Total ITS Funds:** \$900,000

**Estimated Total Project Cost:** \$1,744,057

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## Contacts:

Michael Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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# INTERSECTION COLLISION AVOIDANCE USING ITS COUNTERMEASURES

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**Description:**

Performance requirements (both hardware and human factors) for advanced technology systems to assist drivers in avoiding intersection crashes. This project will lead to the development of performance specifications (both hardware and human factors) for advanced technologies to improve crash avoidance of vehicles negotiating intersections. This project will address autonomous vehicle-based systems, vehicle-vehicle communication systems, and/or cooperative highway-vehicle systems requiring instrumentation of intersections.

**Project Location :**

New York and Ohio

**Contractor(s) :**

CALSPAN Corporation

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**Start Date:**

October 1993

**End Date:**

October 1999

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**Estimated Total ITS Funds:**

\$4,676,000

**Estimated Total Project Cost:**

\$4,676,000

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**Contacts:**

Arthur Carter

NHTSA Headquarters, NRD-51

(202) 366-5669

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## NATIONAL ADVANCED DRIVING SIMULATOR (NADS)

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**Description:**

The objective of this NHTSA project is to develop a design for a state-of-the-art driving simulator in the U.S. that will serve as a national research asset for use by scientists and engineers in both the public and private sectors. It is estimated that NADS will cost \$32 million to design, construct and validate. This driving simulator will enable researchers to conduct multi-disciplinary investigations and analyses on a wide range of issues associated with traffic safety, highway engineering, Intelligent Transportation Systems (ITS), human factors, and motor vehicle product development. Phase I, which is discussed here, covers the design of the NADS. Phase II will cover actual construction.

**Project Location :**

Iowa City, Iowa

**Contractor(s) :**

TRW, Inc.

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**Start Date:**

February 1996

**End Date:**

December 1999

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**Estimated Total  
ITS Funds:**

\$39,100,000

**Estimated Total  
Project Cost:**

\$39,100,000

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**Contacts:**

Keith Brewer

NHTSA Headquarters, NRD-51

(202) 366-5662

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# PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST LANE CHANGE, MERGING, AND BACKING COLLISIONS, PHASES I AND II

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**Description:**

This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance during lane change, merging and backing maneuvers. This project is designed for countermeasure systems that will be self-contained within the vehicle. However, it does not exclude from consideration those countermeasure systems that may require, or that might be improved by, auxiliary equipment installed in the road or in other vehicles.

**Project Location :**

California and Texas

**Contractor(s) :**

Interagency agreement with U.S. Air Force; work conducted by TRW.

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**Start Date:**

July 1993

**End Date:**

September 1999

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**Estimated Total  
ITS Funds:**

\$2,378,000

**Estimated Total  
Project Cost:**

\$2,378,000

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**Contacts:**

Dave Smith

NHTSA Headquarters, NRD-51

(202) 366-5674

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# PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST LANE CHANGE, MERGING, AND BACKING COLLISIONS, PHASE III

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**Description:**

This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance during lane change, merging and backing maneuvers. This project is designed for countermeasure systems that will be self-contained within the vehicle. However, it does not exclude from consideration those countermeasure systems that may require, or that might be improved by, auxiliary equipment installed in the road or in other vehicles.

**Project Location :**

California and Texas

**Contractor(s) :**

Interagency agreement with Defense Microelectronics Activity; work conducted by TRW

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**Start Date:**

April 1997

**End Date:**

June 1999

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**Estimated Total ITS Funds:**

\$2,252,000

**Estimated Total Project Cost:**

\$2,252,000

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**Contacts:**

Dave Smith

NHTSA Headquarters, NRD-51

(202)366-5674

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## PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST ROADWAY DEPARTURE COLLISIONS

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**Description:**

This project will lead to the development of performance requirements (both hardware and human factors) for advanced technologies to improve crash avoidance during roadway departures ("ran-off-road"). This project is designed for countermeasure systems that will be self-contained within the vehicle. However, it does not exclude from consideration those countermeasure systems that may require, or that might be improved by, auxiliary equipment installed in the road or in other vehicles.

**Project Location :**

Pittsburgh, Pennsylvania; Columbus, Ohio; and Buffalo, New York

**Contractor(s) :**

Carnegie Mellon University

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**Start Date:**

September 1993

**End Date:**

March 1999

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**Estimated Total ITS Funds:**

\$4,678,325

**Estimated Total Project Cost:**

\$4,678,325

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**Contacts:**

Lloyd Emery

NHTSA Headquarters, NRD-51

(202) 366-5673

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## SYSTEM FOR ASSESSMENT OF VEHICLE MOTION ENVIRONMENT (SAVME)

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**Description:**

The project is developing VME prototype hardware and software. This project is developing and validating a measurement system that can quantify the specific motions that vehicles exhibit as they move in traffic under the full array of traffic operations. In subsequent projects, the measurement system will be used to gather information such as reaction to other drivers cutting in front, normal following distance and typical lane change trajectories. This information will provide the foundation for development of ITS countermeasures that identify the need for intervention and/or collision avoidance instructions to the driver.

**Project Location :** Michigan

**Contractor(s) :** University of Michigan Transportation Research Institute (UMTRI) and ERIM

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**Start Date:** September 1992

**End Date:** July 1999

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**Estimated Total ITS Funds:** \$1,697,073

**Estimated Total Project Cost:** \$2,235,000

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**Contacts:**

Arthur Carter                      NHTSA Headquarters, NRD-51                      (202) 366-5669

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## VARIABLE DYNAMIC TEST VEHICLE DEVELOPMENT

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**Description:**

A computer-controlled variable subsystems, drive-by-wire (steering, braking, throttle) and four-wheel steering testbed vehicle is being developed. The VDTV will be used by NHTSA to support the ITS crash avoidance and the Intelligent Vehicle Initiative as appropriate.

**Project Location :**

Pasadena, California

**Contractor(s) :**

Jet Propulsion Laboratory

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**Start Date:**

August 1995

**End Date:**

May 1999

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**Estimated Total  
ITS Funds:**

\$2,976,800

**Estimated Total  
Project Cost:**

\$2,976,800

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**Contacts:**

Lloyd Emery

NHTSA Headquarters, NRD-51

(202) 366-5673

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# **Driver Assistance – Information Systems**

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# FEASIBILITY OF SENSOR-FRIENDLY VEHICLES AND ROADWAYS TO SUPPORT INTELLIGENT VEHICLE SERVICES

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**Description:** This project will identify candidate passive devices and methods to mark vehicles and roadway features to facilitate their reliable identification by sensing systems used by intelligent vehicle systems. The candidate methods will be field tested and evaluated. Incremental costs and benefits of deployment will serve as the basis for a strategic national deployment plan.

**Project Location :** San Francisco, California

**Contractor(s) :** Bechtel National, Inc.

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**Start Date:** October 1998

**End Date:** June 2000

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**Estimated Total ITS Funds:** \$500,000

**Estimated Total Project Cost:** \$500,000

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## Contacts:

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680

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# IN-VEHICLE DISPLAY ICONS AND OTHER INFORMATION ELEMENTS

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**Description:**

The objective of this study is to develop analytically and empirically based design guidelines for in-vehicle icons. An extensive literature review of previous research related to icons was conducted as well as a preliminary assessment of visual symbols for in-vehicle systems. Together these made up the analytical phase of this project. The preliminary design guidelines are currently under development. This effort includes the input of a working group consisting of automotive and electronics designers, human factors professionals, and researchers. The resulting design guidelines from this work will feed directly into In-Vehicle Information Systems display guidelines, such as FHWA's ATIS/CVO Design Guidelines.

**Project Location :** Seattle, Washington

**Contractor(s) :** Battelle, Transportation Research Center

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**Start Date:** October 1997

**End Date:** April 2000

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**Estimated Total ITS Funds:** \$999,154

**Estimated Total Project Cost:** \$999,154

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**Contacts:**

Nazemeh Sobhi

FHWA - TFHRC, HSR-30

(703) 285-2907

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# IN-VEHICLE INFORMATION SYSTEMS BEHAVIORAL MODEL AND DESIGN SUPPORT

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**Description:**

The In-Vehicle Information System (IVIS) Behavioral Model and Design Support System will include a set of design tools to assist in the design of an in-vehicle information system and a driver behavioral model to assess candidate in-vehicle information systems. The behavioral model will be capable of taking IVIS design specifications and producing a prediction of driving behavior while using them. The design support system will be a set of human factors tools to be used in the design of in-vehicle information systems. The development of the IVIS Behavioral Model and Design Support System will require empirical research, analysis, and documentation of the design process for in-vehicle information systems. The behavioral model and the design support system will be implemented as a prototype software program and shall be viewed as a demonstration of the feasibility of the concept. The systems specification and Human Computer Interface Specification were recently submitted to FHWA for review. The next major deliverable, the software specification, is due in October 1999.

**Project Location :** Blacksburg, Virginia

**Contractor(s) :** Virginia Polytechnic Institute

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**Start Date:** September 1996

**End Date:** March 2000

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**Estimated Total ITS Funds:** \$796,334

**Estimated Total Project Cost:** \$796,334

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**Contacts:**

Joseph Moyer

FHWA - TFHRC, HSR-30

(703) 285-2008

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# NIGHT DRIVER THERMAL IMAGING CAMERA AND HEAD UP DISPLAY DEVELOPMENT PROGRAM FOR CRASH AVOIDANCE

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**Description:** The focus of this cooperative agreement is to investigate new methods and technologies related to the development of automotive head-up-displays (HUD) and to develop an improved, production-realistic prototype HUD capable of supporting night driving applications and operating reliably in the automotive environment.

**Project Location :** Dallas, Texas

**Contractor(s) :** Raytheon, Texas Instruments Systems (RTIS)

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**Start Date:** September 1997

**End Date:** April 1999

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**Estimated Total ITS Funds:** \$346,340

**Estimated Total Project Cost:** \$698,680

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## Contacts:

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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# SUPPORT SERVICES FOR THE FHWA HUMAN FACTORS PROGRAMS

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**Description:**

This contract provides support to FHWA's Human Factors Team to monitor off-site research contracts and conduct on-site research in the Turner-Fairbank Highway Research Center (TFHRC) Human Factors Laboratory facilities. A significant portion of the off-site contract research involves Intelligent Transportation Systems (ITS) studies. These are in the areas of Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), In-Vehicle Information Systems (IVIS), Advanced Law Enforcement Response Technology (ALERT) and Advanced Traffic Management Systems (ATMS). Likewise, a large portion of the on-site research involves ITS studies. These are in the areas of ATIS, IVIS, ATMS and the integration of in-vehicle information with information coming from outside of the vehicle. The major products are ITS-related research reports, inputs to ITS design guidelines and standards, and inputs to ITS-related traffic models.

**Project Location :**

McLean, VA

**Contractor(s) :**

Science Applications International Corporation (SAIC)

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**Start Date:**

October 1998

**End Date:**

September 2002

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**Estimated Total  
ITS Funds:**

\$2,640,000

**Estimated Total  
Project Cost:**

\$8,500,000

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**Contacts:**

Dr. Sam Tignor

FHWA - TFHRC, HSR-30

(703) 285-2031

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# TECHNICAL SUPPORT FOR IVIS DEVELOPMENT AND OPERATIONAL TEST

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**Description:**

This project was initially titled "Development of An In-Vehicle Information System," and involved the technologies and issues associated with in-vehicle signing systems. It was expanded to include evaluations of an in-vehicle information system for handling all sources on information that may be presented within the vehicle. Completed tasks include reports on "Functional Requirements Specification for an In-Vehicle Information System," "In-Vehicle Information System Concepts," "Cost of In-Vehicle Information Systems and Associated Infrastructure," and "In-Vehicle Information Communication Protocol." A platform is being developed to operationally test new in-vehicle devices which can include routing and navigation, real-time traffic, motorist services, and collision avoidance subsystem. Four workshops have been held.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Oak Ridge National Laboratory

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**Start Date:** June 1994

**End Date:** October 2000

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**Estimated Total ITS Funds:** \$5,162,500

**Estimated Total Project Cost:** \$5,162,500

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**Contacts:**

Dr. Samuel Tignor

FHWA - TFHRC, HSR-30

(703) 285-2031

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**Platform Specific – Emergency  
Use and Special Use Vehicles**

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## OPERATIONAL REVIEW OF SPECIALITY VEHICLE

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**Description:**

The objectives of this study are to:

1. perform a preliminary needs assessment for Specialty Vehicles;
2. develop a set of potential enhancements to the ALERT system with the goal of making the performance of the driver/vehicle unit safer and/or more efficient;
3. develop a set of potential enhancements to current/planned advanced winter maintenance vehicle In-Vehicle Information Systems with the goal of making the performance of the driver/vehicle unit safer and/or more efficient;
4. develop interface recommendations and a set of lessons learned for:
  - police vehicle IVIS designers/integrators
  - advanced winter maintenance vehicle system IVIS designers/integrators.

**Project Location :** Virginia

**Contractor(s) :** Virginia Polytechnic Institute and State University Center for Transportation Research

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**Start Date:** October 1998

**End Date:** April 2001

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**Estimated Total  
ITS Funds:** \$431,871

**Estimated Total  
Project Cost:** \$431,871

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**Contacts:**

Nazemeh Sobhi

FHWA – TFHRC, HSR-30

(703) 285-2907

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## **Platform Specific – Commercial Vehicles**

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# HUMAN FACTORS IN ATIS AND CVO DESIGN EVOLUTION

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**Description:**

The objective of this contract was to develop precise and detailed human factors guidelines for in-vehicle Advanced Traffic Information Systems (ATIS) for both private and commercial ITS applications. The effort consisted of three phases: analytic, empirical, and integrative. The analytic phase was accomplished by examining in-vehicle driver and CVO operator requirements and human factors issues within the context of in-vehicle routing and navigation systems, motorist information services, safety advisory and warning systems, and in-vehicle signing systems. Results were documented in publications that addressed current literature, ATIS/CVO performance requirements, ATIS and CVO functional descriptions and task analysis, and comparable systems analysis and alternative systems. The empirical phase used a systematic approach to select 11 issues to study from a list of 91 candidates issues developed from the analytic phase. Research issues considered to be most important and studied include: driver acceptance; the effects of inaccurate traffic information; transitioning between ATIS functions; fatigue; driver workload; the benefits of multimodal displays; driver response to unexpected situations; the effects of reduced visibility conditions and the effects of safety and warning systems on driver behavior. These experiments are being described in FHWA publications. The product of the integrative phase consists of the final version of the guideline document containing 75 guidelines. This guideline document represents the culmination of the work accomplished in all three phases.

**Project Location :** Washington State

**Contractor(s) :** Battelle Human Affairs Research Center

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**Start Date:** October 1992

**End Date:** March 1999

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**Estimated Total ITS Funds:** \$5,738,525

**Estimated Total Project Cost:** \$5,738,525

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**Contacts:**

Joseph Moyer

FHWA - TFHRC, HSR-30

(703) 285-2008

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**Special Purpose**

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# BENEFIT ASSESSMENT OF INTELLIGENT VEHICLE SYSTEMS

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**Description:** This project will develop needed tools and methodologies to assess the safety and other benefits of intelligent vehicle services.

**Project Location :** Boston, Massachusetts

**Contractor(s) :** Volpe National Transportation Systems Center

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**Start Date:** October 1998

**End Date:** September 1999

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**Estimated Total ITS Funds:** \$250,000

**Estimated Total Project Cost:** \$250,000

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**Contacts:**

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680

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## REVIEW OF SOCIETAL AND INSTITUTIONAL FACTORS FOR THE INTELLIGENT VEHICLE INITIATIVE

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**Description:** This project will identify impacts of the deployment of intelligent vehicle services on society. Specific institutional barriers, including product liability concerns and necessary changes to vehicle insurance coverage, will be defined and solutions recommended. Critical issues related to the role of transportation infrastructure providers will be analyzed.

**Project Location :** New York, New York

**Contractor(s) :** Parsons Brinckerhoff

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**Start Date:** November 1998

**End Date:** October 1999

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**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$200,000

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### Contacts:

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680

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## **Completed Projects**

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## ASSESSMENT OF POTENTIAL BIOLOGICAL EFFECTS FROM ELECTROMAGNETIC RADIATION IN MICROWAVE AND INFRARED REGIONS

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**Description:** Evaluation of potential health hazards that might result from widespread usage of collision avoidance systems using active sensors.

**Project Location :** Pittsburgh, Pennsylvania

**Contractor(s) :** Carnegie Mellon Research Institute

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**Start Date:** July 1994

**End Date:** May 1995

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**Estimated Total  
ITS Funds:** \$53,474

**Estimated Total  
Project Cost:** \$53,474

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### Contacts:

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## AUTONAV/DOT

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**Description:** The U. S. Department of Transportation's National Highway Traffic Safety Administration and the Department of Defense seek to collectively develop dual use emerging collision avoidance technologies to improve surface transportation safety. The U.S. Army Research Laboratory conducted tests and evaluations of each product technology elements of the Autonomous Vehicle Navigation Control System (AUTONAV) project to determine the potential for contribution to the collision avoidance capability of motor vehicles and their drivers.

**Project Location :** Aberdeen and Gaithersburg, Maryland

**Contractor(s) :** The U. S. Army Research Laboratory (ARL)

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**Start Date:** October 1996

**End Date:** June 1998

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**Estimated Total  
ITS Funds:** \$300,000

**Estimated Total  
Project Cost:** \$300,000

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### Contacts:

August Burgett

NHTSA Headquarters, NRD-51

(202) 366-5667

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## BRAKING ANALYSIS FOR COLLISION AVOIDANCE: HEAVY COMMERCIAL VEHICLES

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**Description:** This project studied the feasibility of adding automatic braking to heavy commercial vehicles. The project included braking performance modeling, development of design requirements and fabrication and testing of prototype hardware. This 18-month program concluded with extensive test track work and a demonstration of the prototype system.

**Project Location :** Southfield, Michigan

**Contractor(s) :** Eaton Corporation

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**Start Date:** March 1994

**End Date:** December 1996

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**Estimated Total  
ITS Funds:** \$451,138

**Estimated Total  
Project Cost:** \$559,290

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### Contacts:

Jim Britell

NHTSA Headquarters, NRD-53

(202) 366-5678

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# CHARACTERIZATION OF A FORWARD-LOOKING AUTOMOTIVE RADAR SENSOR

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**Description:** A cooperative agreement to develop knowledge base of radar cross-section data from measurements taken in the laboratory and a variety of freeway settings using a 94GHZ forward looking automotive radar sensor.

**Project Location :** Ann Arbor, Michigan

**Contractor(s) :** Environmental Research Institute of Michigan (ERIM) and TRW, Inc.

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**Start Date:** March 1994

**End Date:** December 1997

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**Estimated Total  
ITS Funds:** \$880,376

**Estimated Total  
Project Cost:** \$1,139,487

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## Contacts:

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## COMMERCIAL VEHICLE COMMUNICATION AND POWERING ENHANCEMENT SYSTEMS - I

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**Description:** This is one of two cooperative agreements that assessed alternative means of providing power and communications on multi-unit combination heavy commercial tractor/trailers. The functional capabilities, limitations, reliability and practicality were evaluated. This contractor assessed a standard seven-pin connector with multiplexing.

**Project Location :** Southfield, Michigan

**Contractor(s) :** EATON Corporation

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**Start Date:** April 1995

**End Date:** January 1998

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**Estimated Total  
ITS Funds:** \$476,169

**Estimated Total  
Project Cost:** \$828,506

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### Contacts:

Jim Britell

NHTSA Headquarters, NRD-53

(202) 366-5678

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## COMMERCIAL VEHICLE COMMUNICATION AND POWERING ENHANCEMENT SYSTEMS - II

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**Description:**

This is one of two cooperative agreements that is assessing alternative means of providing power and communications on multi-unit combination heavy commercial tractor/trailers. The functional capabilities, limitations, reliability and practicality were evaluated. This contractor assessed a standard 13-pin connector with multiplexing, in conjunction with a fiber optic link, and a bi-directional data bus imposed on a power supply circuit.

**Project Location :** Kokomo, Indiana

**Contractor(s) :** DELCO Electronics Corporation

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**Start Date:** November 1995

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$575,000

**Estimated Total  
Project Cost:** \$1,100,000

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**Contacts:**

Jim Britell

NHTSA Headquarters, NRD-53

(202) 366-5678

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## CRASH AVOIDANCE AND THE OLDER DRIVER

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**Description:** Assessment of older driver crash avoidance research needs. The purpose of this initiative was to analyze the traffic crash experience of older drivers, assess their capabilities and limitations as drivers, and identify and evaluate vehicle design features that will ensure the safety of their driving while accommodating their mobility needs.

**Project Location :** Seattle, Washington

**Contractor(s) :** Battelle Memorial Institute

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**Start Date:** March 1994

**End Date:** March 1995

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**Estimated Total  
ITS Funds:** \$90,000

**Estimated Total  
Project Cost:** \$90,000

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### Contacts:

Mike Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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# CRASH AVOIDANCE RESEARCH TECHNICAL SUPPORT: FIELD DATA COLLECTION - PRELIMINARY INVESTIGATION OF THE SAFETY IMPLICATIONS OF CELLULAR PHONE USE IN VEHICLES

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**Description:**

Task Order 4 of the Indefinite Quantity Contract to provide field data collection for the preliminary assessment of and to evaluate public/law enforcement experiences with in-vehicle cellular phone use and its potential impact on driver performance and safety. Also, recommendations for the need to carry out in-depth research in this area.

**Project Location :**

Annapolis, Maryland

**Contractor(s) :**

Dynamic Science

**Start Date:**

February 1995

**End Date:**

September 1995

**Estimated Total ITS Funds:**

\$119,490

**Estimated Total Project Cost:**

\$119,490

**Contacts:**

Michael Goodman

NHTSA Headquarters, NRD-52

(202) 366-5677

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# CRASH AVOIDANCE RESEARCH TECHNOLOGY SUPPORT FOR COMMUNICATIONS, ELECTRONIC CONTROLS AND COMPUTERS - TASK ORDER 1

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**Description:**

This was the first task of a 5-year Indefinite Quantity Contract (IQC) designed to support the research needs of NHTSA in the crash avoidance areas pertaining to communications, electronic controls, and computers. The result of this task was identification and assessment of the main features of automotive computer and electronic interface architectures that may affect the deployment of advanced technology crash systems.

**Project Location :** Virginia

**Contractor(s) :** Stanford Telecommunications, Inc.

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**Start Date:** September 1994

**End Date:** April 1995

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**Estimated Total ITS Funds:** \$104,842

**Estimated Total Project Cost:** \$104,842

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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# CRASH AVOIDANCE RESEARCH TECHNOLOGY SUPPORT FOR COMMUNICATIONS, ELECTRONIC CONTROLS AND COMPUTERS - TASK ORDER 2

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**Description:**

This was the second task in a 5-year Indefinite Quantity Contract (IQC) designed to support the research needs of NHTSA in the crash avoidance areas pertaining to communications, electronic controls, and computers. The objective of this task was to determine the architectures, interfaces, and data flows needed to support the safety related ITS user services, as defined in the ITS National Program Plan, within the framework of the National ITS Architecture.

**Project Location :** Virginia

**Contractor(s) :** Stanford Telecommunications, Inc.

---

**Start Date:** June 1995

**End Date:** May 1996

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**Estimated Total ITS Funds:** \$175,651

**Estimated Total Project Cost:** \$175,651

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## CRASH AVOIDANCE RESEARCH TECHNOLOGY SUPPORT FOR COMMUNICATIONS, ELECTRONIC CONTROLS, AND COMPUTERS - TASK ORDER 3

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**Description:**

This is the third task in a five-year Indefinite Quantity Contract (IQC) designed to support the research needs of NHTSA in the crash avoidance areas pertaining to communications, electronic controls, and computers. The objective of this task was to predict the performance of electronic busses for in-vehicle communication requirements for ITS safety-related user services.

**Project Location :** Virginia

**Contractor(s) :** Stanford Telecommunications, Inc.

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**Start Date:** July 1996

**End Date:** May 1997

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**Estimated Total  
ITS Funds:** \$260,377

**Estimated Total  
Project Cost:** \$260,377

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## CRASH AVOIDANCE RESEARCH TECHNOLOGY SUPPORT FOR COMMUNICATIONS, ELECTRONIC CONTROLS, AND COMPUTERS - TASK ORDER 4

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**Description:**

This is the fourth task in a five-year Indefinite Quantity Contract (IQC) designed to support the research needs of NHTSA in the crash avoidance areas pertaining to communications, electronic controls, and computers. The objective of this task was to conduct an extensive analysis of the performance of current and developing in-vehicle data buses to support a variety of automotive safety systems using discrete event simulation software tools and to study and report on the current development of infrastructure and inter-vehicular communications protocols and implementations that affect performance of future safety systems.

**Project Location :** Virginia

**Contractor(s) :** Stanford Telecommunications, Inc.

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**Start Date:** November 1997

**End Date:** November 1998

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**Estimated Total  
ITS Funds:** \$424,868

**Estimated Total  
Project Cost:** \$424,868

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## DEVELOP AN ANALYTICAL MODELING FRAMEWORK/COLLISION AVOIDANCE SYSTEM

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**Description:**

This project is the first task of an Indefinite Quantity Contract (IQC) titled "Crash Avoidance Research Technology Support - Simulation Models." The objective of this task was the development of an analytical framework that can be used to combine a number of ITS program features. The framework provided a means for assessing the safety impact of collision avoidance concepts and systems.

**Project Location :**

Michigan

**Contractor(s) :**

University of Michigan Transportation Research Institute (UMTRI)

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**Start Date:**

July 1994

**End Date:**

November 1995

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**Estimated Total ITS Funds:**

\$199,940

**Estimated Total Project Cost:**

\$199,940

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**Contacts:**

Lloyd Emery

NHTSA Headquarters, NRD-51

(202) 366-5673

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## DIRECT PSYCHOPHYSIOLOGICAL MONITORING OF DRIVER ALERTNESS

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**Description:**

This Small Business Innovative Research (SBIR) project developed a low cost device for direct monitoring of eye activity as an indicator of driver alertness. The device, Personal Alertness Monitor (PAM), is able to function as a stand alone alertness monitor. PAM also has the capability to work cooperatively with driver performance monitoring systems, as a component of a more complex system that includes continuous measure of driver performance, and with an integrated protocol for the presentation of warning signals. Phase I of the project is complete and resulted in a working prototype.

**Project Location :** Chelmsford, Massachusetts

**Contractor(s) :** MTI Research, Inc.

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**Start Date:** October 1993

**End Date:** June 1997

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**Estimated Total  
ITS Funds:** \$243,964

**Estimated Total  
Project Cost:** \$243,964

**Contacts:**


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Paul Rau

NHTSA Headquarters, NRD-53

(202) 366-0418

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## DRIVER STATUS/PERFORMANCE MONITORING

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**Description:**

Cooperative Agreement leading to the development of detection algorithms and alerting mechanisms for a vehicle-based drowsy driver detection/warning system, countermeasures that will monitor driver status/performance and detect degraded performance to provide a warning signal or other countermeasure to prevent its continuance. The program developed vehicle-based detection algorithms for reduced driver performance (e.g., symptomatic of drowsiness/fatigue) and test candidate driver interfaces (i.e., advisories and alerting stimuli). These results provide the basis for the development of an on-road prototype.

**Project Location :**

Blacksburg, Virginia

**Contractor(s) :**

Virginia Polytechnic Institute and State University

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**Start Date:**

September 1991

**End Date:**

December 1996

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**Estimated Total  
ITS Funds:**

\$660,000

**Estimated Total  
Project Cost:**

\$835,000

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**Contacts:**

Paul Rau

NHTSA Headquarters, NRD-53

(202) 366-0418

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## EVALUATION OF ASSESSING POTENTIAL HEALTH HAZARDS FROM WIDE-SPREAD USAGE OF ANTI-COLLISION DEVICES USING ITS TECHNOLOGIES

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**Description:** Evaluation of potential health hazards that might result from widespread use of collision avoidance systems using active sensors. This project conducted an evaluation of potential health hazards that might result from wide-spread usage of anti-collision devices using ITS technologies.

**Project Location :** S. Deerfield, Massachusetts

**Contractor(s) :** Millitech Corporation

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**Start Date:** October 1993

**End Date:** December 1995

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**Estimated Total  
ITS Funds:** \$100,000

**Estimated Total  
Project Cost:** \$124,000

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**Contacts:**

August Burgett

NHTSA Headquarters, NRD-51

(202) 366-5572

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## EVALUATION OF TRAVELAID OPERATIONAL TEST

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**Description:** Safety assessment of operational task of TRAVELAID hazard warning system.

**Project Location :** Washington State

**Contractor(s) :** Washington State Transportation Center (TRAC)

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**Start Date:** June 1992

**End Date:** August 1998

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**Estimated Total  
ITS Funds:** \$250,000

**Estimated Total  
Project Cost:** \$250,000

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### Contacts:

August Burgett

NHTSA Headquarters, NRD-51

(202) 366-5672

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## HEAD UP DISPLAY (HUD): DRIVER AGE AND VISUAL INTERFERENCE CONCERNS

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**Description:** Experimental data on ability of younger and older drivers to respond to safety relevant roadway objects when using HUDs.

**Project Location :** Lansdale, Pennsylvania

**Contractor(s) :** Scientex Corp.

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**Start Date:** August 1994

**End Date:** September 1997

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**Estimated Total  
ITS Funds:** \$290,000

**Estimated Total  
Project Cost:** \$290,000

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### Contacts:

Michael Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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## HEAVY VEHICLE INTELLIGENT DYNAMIC STABILITY ENHANCEMENT SYSTEMS

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**Description:**

The purpose of this project was to develop stability-enhancing systems for heavy trucks to reduce the incidence of vehicle rollover. The first product was a rollover warning system to be developed for a typical tractor-trailer, and will display to the driver how close to the rollover threshold the vehicle is being operated. The second product was a rearward amplification suppression system for multiple-trailer trucks. This system applied individual brakes on the vehicle to improve the stability and prevent trailer rollovers during vehicle maneuvers that typically excite the trailers in lateral acceleration.

**Project Location :** Ann Arbor, Michigan

**Contractor(s) :** University of Michigan Transportation Research Institute (UMTRI)

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**Start Date:** June 1995

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$650,000

**Estimated Total  
Project Cost:** \$1,321,876

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**Contacts:**

Jim Britell

NHTSA Headquarters, NRD-53

(202) 366-5678

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# HUMAN FACTORS DESIGN OF AUTOMATED HIGHWAY SYSTEMS

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## **Description:**

Guidance on human factors issues is of critical importance to Automated Highway Systems (AHS) planners and designers. This research effort provided timely human factors input during the conceptual stages of AHS development to aid in the design and implementation of the 1997 demonstration as well as provide the foundation for the future advancement of AHS objectives.

This project included both analytic and empirical tasks. In the early portion of the project, first generation AHS scenarios, including descriptions of AHS operations, objectives, and performance requirements, were developed. These scenarios were used as the basis for analytic and empirical research investigations addressing broad AHS human factors issues. In an iterative process, data from these efforts were used to refine and revise the scenarios. The refined scenarios formed the basis for a second set of empirical research investigations, addressing more detailed, system-specific AHS human factors issues. The culmination of these efforts were an AHS Human Factors Handbook for AHS Designers and Driver-based AHS Human Factors System and Development Guidelines.

**Project Location :** Minnesota and Iowa

**Contractor(s) :** Honeywell, Inc.

**Start Date:** October 1992

**End Date:** March 1996

**Estimated Total  
ITS Funds:** \$5,266,140

**Estimated Total  
Project Cost:** \$5,266,140

## **Contacts:**

Elizabeth Alicandri

FHWA - TFHRC, HSR-30

(703) 285-2415





## HUMAN FACTORS PROGRAMS: ADMINISTRATIVE AND TECHNICAL SUPPORT

### **Description:**

This effort focused on providing the necessary staffing and expertise required to assist the FHWA's Human Factors group in conducting and monitoring research efforts on various ITS subsystems. These studies included human factors investigations in Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Automated Highway Systems (AHS), and Commercial Vehicle Operations (CVO). On-site staff research areas include In-Vehicle Signing (IVS) and In-Vehicle Safety Advisory Warning Systems (IVSAWS).

The major contractual efforts (involving ATMS, ATIS, and AHS) were monitored in regard to critical analytical, empirical and integration human factors issues that will result in design guidelines addressing the specific and integrated ITS areas. The empirical aspect was of pivotal importance in that numerous simulation and field research studies will be conducted and analyzed to provide specific human factors research results that will be transformed into design guidelines and computer-aided design packages. In-house ITS research staff projects are also developed, managed, and monitored as part of the Human Factors Research Program. Significant human factors ITS knowledge gaps that are identified will be addressed through contract or staff research.

**Project Location :** McLean, Virginia

**Contractor(s) :** Science Applications International Corporation (SAIC)

**Start Date:** April 1994

**End Date:** October 1998

**Estimated Total ITS Funds:** \$4,530,000

**Estimated Total Project Cost:** \$7,900,000

### **Contacts:**

Dr. Sam Tignor

FHWA - TFHRC, HSR-30

(703) 285-2301



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## HUMAN FACTORS REQUIREMENTS FOR SIDE OBJECT DETECTION WARNING SYSTEMS

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**Description:** This program collected human factors data to support the development of recommendations for the information display characteristics of side object detection/warning systems.

**Project Location :** Seattle, Washington

**Contractor(s) :** Battelle Memorial Institute

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**Start Date:** January 1995

**End Date:** December 1996

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**Estimated Total  
ITS Funds:** \$450,000

**Estimated Total  
Project Cost:** \$450,000

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### Contacts:

Michael Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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# INTELLIGENT CRUISE CONTROL FIELD OPERATIONAL TEST

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**Description:**

The field operational test serves as a bridge between research and development and deployment. The performance and user acceptance of a system that permits a vehicle to maintain automatically a safe level of speed and distance between it and preceding vehicles were tested and evaluated on a fleet of vehicles.

**Project Location :** Michigan

**Partner(s) :**

The Regents of the University of Michigan Transportation Research Institute (UMTRI), Michigan DOT, Leica AG (now A.D.C. GmbH), and Haugen Associates

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**Start Date:** September 1995

**End Date:** July 1998

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**Estimated Total  
ITS Funds:** \$3,010,498

**Estimated Total  
Project Cost:** \$3,874,121

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**Contacts:**

August Burgett

NHTSA Headquarters, NRD-51

(202) 366-5672

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## IN-VEHICLE CRASH AVOIDANCE WARNING SYSTEM - HUMAN FACTORS CONSIDERATIONS

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**Description:**

Development of human factors guidelines for in-vehicle warning systems. The focus of this project was the development of human factors guidelines to ensure that the design of in-vehicle crash avoidance warning systems is compatible with driver capabilities, limitations and needs. Human factors data were collected to determine desirable human interface requirements for rear object crash warning systems.

**Project Location :** Silver Spring, Maryland

**Contractor(s) :** COMSIS, Inc.

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**Start Date:** September 1991

**End Date:** September 1996

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**Estimated Total  
ITS Funds:** \$953,000

**Estimated Total  
Project Cost:** \$953,000

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**Contacts:**

Michael Perel

NHTSA Headquarters, NRD-52

(202) 366-5675

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## IN-VEHICLE SAFETY ADVISORY AND WARNING SYSTEMS (IVSAWS)

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**Description:**

The In-Vehicle Safety Advisory and Warning System is a Federal Highway Administration program to develop a nationwide vehicle information system that provides drivers with advance, supplemental notification of dangerous road conditions using electronic warning zones with precise areas of coverage. Extensive market investigation with the public and safety professionals revealed that while they both liked the IVSAWS concept, safety professionals wanted maximum compatibility with existing procedures, and motorists were concerned with avoiding false alarms. The operational concept selected uses centralized broadcasts from a regional IVSAWS operations center. Systems design analysis showed that an electronic warning zone with a specific area of coverage is the proper means to guarantee relevant alerts. Furthermore, a geolocation capability is the cost-effective means for implementing these electronic warning zones. Two candidates were selected which are compatible with centralized broadcasts and available geolocation systems.

**Project Location :** Fullerton, California

**Contractor(s) :** Hughes Ground Systems Group

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**Start Date:** September 1990

**End Date:** March 1995

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**Estimated Total  
ITS Funds:** \$1,000,000

**Estimated Total  
Project Cost:** \$1,250,000

**Contacts:**

James Arnold

FHWA - TFHRC, HSR-10

(703) 285-2974



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## NATIONAL AUTOMATED HIGHWAY SYSTEM CONSORTIUM

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**Description:**

The National AHS Consortium successfully demonstrated the feasibility of both partially and fully automated vehicle-highway systems at Demo '97, on I-15 in San Diego. Building on this, the consortium worked within the framework of the new USDOT Intelligent Vehicle Initiative (IVI), to provide guidance on the potential contribution of cooperative (vehicle-vehicle and vehicle-infrastructure) concepts for providing IVI services vs. autonomous vehicle concepts. The research results, and recommendations for future research were presented in a workshop for April 1998.

**Project Location :** Troy, Michigan (NAHSC Program Office)

**Contractor(s) :** The NAHSC Consortium

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**Start Date:** November 1994

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$58,200,000

**Estimated Total  
Project Cost:** \$58,200,000

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**Contacts:**

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680



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## PATH COOPERATIVE AVCSS RESEARCH PROGRAM

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**Description:**

This program was a cooperative agreement between FHWA, CalTrans, and PATH for the research of vehicle-follower longitudinal control technologies. The program was divided into three major work areas: (1) sensor technologies, (2) vehicle-to-vehicle communications, and (3) vehicle-follower longitudinal control. The vehicle-follower work area was further researched in the following areas: system performance and test specifications, braking actuators technology, hardware computing platforms, operating system, control software development, and testing of vehicle-follower longitudinal control systems.

**Project Location :**

Richmond, California

**Partner(s) :**

Partners for Advanced Transit and Highway (PATH)

**Start Date:**

October 1994

**End Date:**

March 1997

**Estimated Total  
ITS Funds:**

\$1,275,000

**Estimated Total  
Project Cost:**

\$2,500,000

**Contacts:**

Robert Ferlis

FHWA - TFHRC, HSR-10

(703) 285-2680

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## PERFORMANCE SPECIFICATIONS: COUNTERMEASURES AGAINST REAR-END COLLISIONS

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**Description:**

This project led to the development of performance requirements (both hardware and human factors) for advanced technologies to prevent or decrease the severity of rear-end crashes. This project was designed for countermeasure systems that will be self-contained within the vehicle. However, it does not exclude from consideration those countermeasure systems that may require, or that might be improved by, auxiliary equipment installed in the road or in other vehicles.

**Project Location :** Arizona and Iowa

**Contractor(s) :** Sensor Technologies & Systems, Inc. (formerly Frontier Engineering, Inc.)

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**Start Date:** May 1993

**End Date:** October 1998

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**Estimated Total  
ITS Funds:** \$4,430,773

**Estimated Total  
Project Cost:** \$4,430,773

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**Contacts:**

Art Carter

NHTSA Headquarters, NRD-51

(202) 366-5669





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## PORTABLE HUMAN FACTORS DATA ACQUISITION SYSTEM FOR CRASH AVOIDANCE RESEARCH (DASCAR)

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**Description:**

The objectives of this project were to apply state-of-the-art technology and methods to develop an easily-installed, portable instrumentation package and a set of analytical methods/tools to allow driver-vehicle performance data to be collected using a variety of vehicle types. This project covered Phase I, which recommended system design and software specifications.

**Project Location :**

Oak Ridge, Tennessee

**Contractor(s) :**

Oak Ridge National Laboratory

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**Start Date:**

September 1992

**End Date:**

December 1995

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**Estimated Total  
ITS Funds:**

\$1,198,000

**Estimated Total  
Project Cost:**

\$1,198,000

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**Contacts:**

Michael Goodman

NHTSA Headquarters, NRD-52

(202) 366-5677

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## PRELIMINARY HUMAN FACTORS REVIEW OF INTELLIGENT VEHICLE INITIATIVE (IVI)

### **Description:**

The objective of this activity was to establish the human factors research needs for the near-term intelligent vehicles in the Intelligent Vehicle Initiative (IVI). This project included the solicitation of input from stakeholders and researchers, and consensus building for the design of human-centered IVI vehicles. In this study, preliminary infrastructure and in-vehicle architecture requirements for IVI Generation 1, 2, and 3 vehicles (with emphasis on Generation 1) were identified and analyzed. This analysis primarily included the needs for passenger cars, and to a lesser extent the needs for trucks, buses, and emergency/special vehicles. Twenty-six User Services were grouped into seven technology modules which were combined to create five candidate configurations for IVI vehicles. The requirements for infrastructure, vehicle, and human factors research for each candidate configuration were documented. A final report and six flyers were generated and are currently available through HSR-30.

### **Project Location :**

Columbus, Ohio

### **Contractor(s) :**

Battelle, Human Affairs

### **Start Date:**

September 1997

### **End Date:**

August 1998

### **Estimated Total ITS Funds:**

\$350,000

### **Estimated Total Project Cost:**

\$350,000

### **Contacts:**

Joseph Moyer

FHWA - TFHRC, HSR-30

(703) 285-2008



# PROBLEM DEFINITION AND ANALYSIS OF TARGET CRASHES AND ITS COUNTERMEASURE ACTIONS

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**Description:**

An analytical methodology for defining, analyzing, and modeling target crashes and ITS/crash avoidance countermeasure action for use in establishing research priorities and/or assessing potential safety benefits. This project has developed an analytical methodology for defining, analyzing, and modeling target crashes and ITS/crash avoidance countermeasure action for the purpose of assessing potential effectiveness and identifying R&D priorities and/or assessing potential safety benefits. The methodology has been applied to several types of collision. These findings will help the U.S. DOT to prioritize and guide research and development on these countermeasures.

**Project Location :** Columbus, OH

**Contractor(s) :** Battelle, CALSPAN, Castle Rock

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**Start Date:** August 1991

**End Date:** April 1995

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**Estimated Total  
ITS Funds:** \$1,877,000

**Estimated Total  
Project Cost:** \$1,877,000

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**Contacts:**

Duane Perrin

NHTSA Headquarters, NRD-53

(202) 366-5654

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## PROTOTYPE HEAVY VEHICLE DROWSY DRIVER DETECTION AND WARNING SYSTEM

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**Description:**

This project developed, tested, and evaluated a prototype in-vehicle continuous driver alertness monitoring/drowsiness detection system for heavy trucks. System drowsiness detection algorithms and warning signals were derived primarily from the findings of the Driver Status/Performance Monitoring program. Based on the prototype design and lessons learned from the test and evaluation, a system functional performance specification was developed.

**Project Location :** Pittsburgh, Pennsylvania

**Contractor(s) :** Carnegie Mellon Research Institute

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**Start Date:** July 1995

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$2,085,000

**Estimated Total  
Project Cost:** \$2,085,000

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**Contacts:**

Paul Rau

NHTSA Headquarters, NRD-53

(202) 366-0418

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## PUGET SOUND HELP ME (PUSHME) MAYDAY SYSTEM

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**Description:** The primary objective of this project was to assess operational, institutional and technology requirements for implementing a regional MAYDAY system that would allow a driver to send an immediate notification of an incident, its location and need for assistance to a response center.

**Project Location :** Puget Sound (Northwest Washington State) region

**Partner(s) :** Washington State DOT, Washington State Patrol, David Evans and Associates, Motorola, IBI Group, Sentinel Communications, Response Systems Partners, and University of Washington

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**Start Date:** August 1994

**End Date:** September 1997

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**Estimated Total  
ITS Funds:** \$1,400,000

**Estimated Total  
Project Cost:** \$2,500,000

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### Contacts:

Mike Morrow	FHWA, Washington Division, HPM-WA	(360) 753-9551
Pete Briglia	Washington State DOT	(206) 543-3331



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## RESEARCH AND TECHNOLOGY REVIEW FOR DRIVER VISION ENHANCEMENT SYSTEMS

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**Description:**

This project conducted a state-of-the-art review of research and technologies which are relevant to proposed and future driver vision enhancement systems.

**Project Location :** Pittsburgh, Pennsylvania

**Contractor(s) :** Carnegie Mellon Research Institute (CMRI)

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**Start Date:** January 1994

**End Date:** August 1994

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**Estimated Total  
ITS Funds:** \$100,000

**Estimated Total  
Project Cost:** \$100,000

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**Contacts:**

Jack Ference

NHTSA Headquarters, NRD-51

(202) 366-0168

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## SAFETY EVALUATION OF TRAVTEK OPERATIONAL TEST

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**Description:** Safety assessment of operational test of traffic route guidance and navigation system.

**Project Location :** McLean, Virginia

**Contractor(s) :** SAIC

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**Start Date:** September 1991

**End Date:** June 1995

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**Estimated Total  
ITS Funds:** \$450,000

**Estimated Total  
Project Cost:** \$450,000

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### Contacts:

August Burgett

NHTSA Headquarters, NRD-51

(202) 366-5672

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## STANDARDIZED DRIVING SIMULATION TASKS AND SCENARIOS

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**Description:**

The objective of this NHTSA project was to specify and develop a set of driving tasks and scenarios that can be used as standard reference test conditions for assessments/evaluations of driver performance under a number of experimental conditions involving both normal driving and imminent crash threats. These tasks/scenarios/protocols were derived from predominant driving patterns and crash types, and will be used in advanced driving simulators, including the National Advanced Driving Simulator (NADS).

**Project Location :**

Iowa City, Iowa

**Contractor(s) :**

University of Iowa

**Start Date:**

September 1993

**End Date:**

September 1995

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$400,000

**Contacts:**

Duane Perrin

NHTSA Headquarters, NRD-53

(202) 366-5654





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## VEHICLE FEEDBACK CUES AND DRIVER PERFORMANCE

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**Description:** This project identified and analyzed vehicle feedback cues which most influence a driver's safety-relevant behavior and performance. Additionally, the project developed evaluation protocols and performance specifications for technology that affects feedback cues that drivers use to control the vehicle.

**Project Location :** Michigan

**Contractor(s) :** University of Michigan Transportation Research Institute (UMTRI)

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**Start Date:** September 1992

**End Date:** October 1995

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**Estimated Total  
ITS Funds:** \$150,000

**Estimated Total  
Project Cost:** \$150,000

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### Contacts:

Duane Perrin

NHTSA Headquarters, NRD-53

(202) 366-5654

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## VEHICLE-BASED LANE DETECTION

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**Description:**

This program is a cooperative agreement with Rockwell International to conduct a two-year field evaluation of a prototype machine vision lane detection sensor. Sensor performance was evaluated under various operating conditions and general lane detection sensor performance requirements were identified. Estimation of future vehicle position is key capability that will be an integral part of collision avoidance and automatic vehicle control systems. No viable technology to perform this function reliably and inexpensively is currently commercially available. The TASK 1 system validation effort has been completed and the TASK 2 data collection and analysis effort is about to begin.

**Project Location :** Anaheim, California

**Contractor(s) :** Rockwell International

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**Start Date:** April 1994

**End Date:** October 1996

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**Estimated Total  
ITS Funds:** \$824,733

**Estimated Total  
Project Cost:** \$824,733

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**Contacts:**

Lloyd Emery

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(202) 366-5673

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## **VI. EVALUATION/PROGRAM ASSESSMENT**

## VI. EVALUATION/PROGRAM ASSESSMENT

Program evaluation is critical to ensuring progress toward the vision of integrated intelligent transportation systems and achieving deployment goals. Evaluation is indispensable to an understanding of the value, effectiveness and impacts of ITS Program activities. Equally important, evaluation allows for continual refinement of the Program. The ITS Program has undertaken assessment activities to satisfy these needs, and to use the Government Performance and Results Act to help ensure that the Program is effective in meeting the Government's higher-level transportation goals. To further these objectives, the following are included in activities that have been undertaken:

- Tracking ITS infrastructure by establishing a baseline of existing ITS deployments throughout the nation's metropolitan areas and updating this information *annually*.
- Evaluating the effectiveness and benefits versus costs of ITS infrastructure at the metropolitan and CVISN model deployment sites, as well as at field operational test sites.

**Evaluation.** The most effective ITS evaluation activities are those that are intertwined with ITS projects throughout their life cycle. A principal benefit of evaluation is early participation of independent evaluators with project teams to ensure clear identification of the project goals and objectives, standards for successful performance, and measures of effectiveness agreed to by the project partners or project teams. Because evaluation is inherent to successful performance of any program, evaluation efforts (e.g., as part of research and development, field operational tests, mainstreaming, and architecture and standards work) are included as part of other sections of this projects report. Projects listed in this section are those that concentrate upon evaluations, or improving evaluation methods. With the selection of the four Metropolitan ITS Model Deployment sites and the initiation of the eight-state CVISN Pilot Projects, special emphasis is being placed on the evaluation of these projects by the ITS Joint Program Office (JPO). Moreover, future field operational tests will be evaluated by the ITS JPO. These evaluations are being provided through two parallel ITS Program Assessment Support (IPAS) contracts.

**Program Assessment.** Program assessment takes a global look at the U.S. ITS Program. Projects listed in this section of the ITS projects report focus on methods of integrating evaluation results to assess higher level program goals and objectives. Program assessment ultimately leads to investment strategies that must take an integrated look at program cost and effectiveness so that resources can be allocated to address the best solution approaches. Other projects listed in this section address methods for measuring ITS costs and benefits. The ITS Deployment Tracking Projects are the key activities dedicated to defining and tracking infrastructure deployment and integration to enable measurement of progress toward the Secretary of Transportation's deployment goals.

Finally, the Evaluation/Assessment Program results in a significant volume of reports which document the impacts and benefits of ITS at deployment and operational test sites. The ITS JPO Program Assessment activity is engaged in refining and transforming technical documentation into a stream of summary and more extensive reports for easy assimilation by decision-makers, planners, and implementers at the state and local levels of government and their private sector partners.

# **Research**

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## ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS) OPERATIONAL TEST EVALUATIONS

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**Description:**

Project evaluation is the link between operational tests and technology transfer from the APTS Program. It serves as the bridge between the conduct of a particular operational test and understanding the actual performance at the site, as well as potential effectiveness at other locales. Specific objectives for each test are identified along with measures of effectiveness to communicate results to all interested professionals. Key issues are being evaluated ranging from the reliability of particular new technologies in transit applications to the effectiveness of new service and management methods made possible by the technologies. Crosscutting studies will develop a national set of insights across different site conditions.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

**Start Date:**

October 1994

**End Date:**

April 2000

**Estimated Total  
ITS Funds:**

\$1,600,000

**Estimated Total  
Project Cost:**

\$1,600,000

**Contacts:**

Bert Arrillaga	FTA Headquarters, TRI-12	(202) 366-0231
Robert Casey	Volpe National Transportation Systems Center	(617) 494-2213



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## EVALUATION OF AUTOMATED COLLISION NOTIFICATION OPERATIONAL FIELD TEST

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**Description:** The objective of this project is to conduct an independent safety evaluation of an operational field test of an in-vehicle system which will automatically determine that a serious crash has occurred and then summon an Emergency Medical Services (EMS) response, especially in rural areas.

**Project Location :** Laurel, Maryland

**Contractor(s) :** Applied Physics Laboratory of the Johns Hopkins University

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**Start Date:** September 1995

**End Date:** October 1999

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**Estimated Total  
ITS Funds:** \$797,213

**Estimated Total  
Project Cost:** \$797,213

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### Contacts:

Art Carter

NHTSA Headquarters, NRD-51

(202) 366-5669

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## EVALUATION SUPPORT FOR ITS OPERATIONAL TESTS

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**Description:**

This is a support contract intended to provide technical support to FHWA headquarters and field offices as well as the operational test partners in designing and conducting operational test evaluations. The intent is to ensure the evaluations of the operational tests support the national ITS program. The level of support varies from test to test depending on need and ranges from the review of draft plans and reports to the actual development of these plans and reports in some cases.

**Project Location :**

McLean, Virginia

**Contractor(s) :**

Booz, Allen, Hamilton & Associates

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**Start Date:**

July 1994

**End Date:**

June 1999

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**Estimated Total  
ITS Funds:**

\$8,832,000

**Estimated Total  
Project Cost:**

\$10,059,212

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**Contacts:**

Michael Freitas

FHWA - TFHRC, HSR-10

(703) 285-2421

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## ITS PROGRAM ASSESSMENT SUPPORT (IPAS)

### **Description:**

These are support contracts intended to provide ITS program assessment technical and program support in the following areas:

- (1) Design, manage, implement, and support independent evaluations of the effectiveness of ITS projects, including Metropolitan and CVISN Model Deployments, showcases, and other ITS.
- (2) Collect and analyze ITS performance, benefits, cost, economic, and program data. Data and information collected can be used to identify benefit/costs of ITS projects to support inclusion of ITS technology in state and local transportation problem solving.
- (3) Synthesize the information produced in (2); evaluate the degree to which ITS policies and procedures have led to the achievement of current ITS costs, schedule, and performance goals; and provide yearly quantitative and qualitative inputs to the refinement of goals and the resultant Federal ITS investment strategy.
- (4) Develop and refine the tools and information needed to support the JPO Program assessment and decision-making process.

### **Project Location :**

Washington, DC; (4) Metropolitan Model Deployment Sites; (10) State CVISN Pilot And Prototype Model Deployments

### **Contractor(s) :**

SAIC; Battelle Memorial Institute

### **Start Date:**

September 1996

### **End Date:**

August 2001

### **Estimated Total ITS Funds:**

\$25,000,000

### **Estimated Total Project Cost:**

\$25,000,000

### **Contacts:**

Joe Peters

USDOT ITS JPO, HVH-1

(202) 366-2202



## ITS USER ACCEPTANCE RESEARCH

### **Description:**

This program examined two aspects of user acceptance of ITS products and services. 1) The ITS Joint Program Office is conducting primary research to measure end-users' acceptance and willingness to pay for ITS user services. The program goal is to identify obstacles to and opportunities for encouraging broader ITS deployment. User groups include operators of commercial vehicles, private travelers, and public sector transportation managers. 2) Examining the evolution of the ITS consumer market, this user acceptance research project provides periodic reports on the market for traffic and traveler information products and services.

Completed reports (in chronological order) include "Critical Issues Relating to Acceptance of Commercial Vehicle Operations Services by Interstate Truck and Bus Drivers," May, 1995, Penn & Schoen Assoc.; "User Acceptance of ATIS Products and Services: A briefing book on the current status of JPO research," March, 1996, Charles River Assoc.; "ITS User Acceptance on Public Sector Transportation Managers: A Summary of Current ITI Deployment Knowledge," March, 1996, John A. Volpe National Transportation Systems Center;" "An Update of the Commercial ATIS Market," March, 1996, and January, 1997, Volpe Center;" "User Acceptance of ATIS Products and Services: What do we currently know?" October, 1996, Charles River Assoc.; "Acceptance of ATIS Products and Services: A report of qualitative research," December, 1996, Charles River Assoc.;" "An Assessment of the ITS Commercial Trucking Market," February, 1997, Volpe Center, "Marketing ITS Infrastructure in the Public Interest," May 1998.

Research in process for publication in fiscal year 1999 will address market demand of private travelers for in-vehicle crash avoidance countermeasures and advanced traveler information services.

### **Project Location :**

Washington, DC

### **Contractor(s) :**

Contract for CVO: Penn & Schoen Associates, Contract for research on private travelers: Charles River Associates, and Contract for economic analysis: Volpe National Transportation Systems Center

### **Start Date:**

January 1994

### **End Date:**

September 1999

### **Estimated Total ITS Funds:**

\$2,647,680

### **Estimated Total Project Cost:**

\$2,647,680

### **Contacts:**

Jane Lappin

EG&G Dynatrend

(617) 494-3692



# METROPOLITAN ITS INFRASTRUCTURE DEPLOYMENT TRACKING

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**Description:**

The purpose of this project is to provide the ITS Joint Program Office feedback on achieving the US DOT Operation TimeSaver goal. This goal is to deploy a metropolitan ITS infrastructure nationwide by December 2005. The project uses a three-step process: 1) Define major indicators of both component and integration deployment; 2) Periodically measure the presence of these indicators at 78 of the nation's largest metropolitan areas compared to the opportunity for deployment; and, 3) Work with partners at these sites to ascertain deployment goals and report back deployment against these goals. This approach acknowledges that ITS must be tailored to individual needs within each metropolitan area and that such needs are determined in a cooperative working environment among Federal, State, and local government participants. To date, there has been much progress in defining a set of indicators and obtaining a baseline measurement of these indicators. Analysis and quality review of the baseline data was performed in FY 1998 to ensure the reliability and validity of the data and the indicator definitions. As a result of this work, an FY 1997 baseline was established and published. Work on a FY 1999 update to the database is underway. This effort will include provision for gathering information on local deployment goals.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Oak Ridge National Laboratory

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**Start Date:** October 1995

**End Date:** December 2005

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**Estimated Total  
ITS Funds:** \$950,000

**Estimated Total  
Project Cost:** \$950,000

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**Contacts:**

Joe Peters

USDOT ITS JPO, HVH-1

(202) 366-2202

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## **Completed Projects**

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## ITS BENEFITS ASSESSMENT FRAMEWORK

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**Description:**

This project developed an analytical framework for assessing the benefits achievable from the deployment of ITS technologies and strategies. The framework utilizes existing computer models for estimating potential changes in congestion, vehicle emissions, energy consumption, safety and other values. Although the framework is intended to encompass most ITS technologies, this project was primarily concentrated on Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), and interacting Advanced Public Transit Systems (APTS). Planning models were used to assess both short- and long-term impacts of proposed ITS deployments. The product of this effort is a set of interrelated models for estimating the impacts of specific ITS deployment alternatives. Network and corridor case studies were produced using existing operational tests and corridor projects for which data exists.

**Project Location :** Cambridge, Massachusetts

**Contractor(s) :** Volpe National Transportation Systems Center

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**Start Date:** April 1992

**End Date:** September 1995

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**Estimated Total  
ITS Funds:** \$2,000,000

**Estimated Total  
Project Cost:** \$2,000,000

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**Contacts:**

Paula Ewen

USDOT ITS JPO, HVH-1

(202) 366-9682

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# ITS NATIONAL INVESTMENT AND MARKET ANALYSIS

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## **Description:**

The ITS National Investment and Market Analysis provided public agencies, private companies, and legislatures with an understanding of the scope, cost, and resulting benefits and opportunities expected to emerge as a result of realizing the national goals of fully deploying Intelligent Transportation Systems in the United States. Results of this study also will be used to inform discussions and hearings on the Intermodal Surface Transportation Efficiency Act (ISTEA) reauthorization and the Federal FY98 budget in early 1997.

This study supplemented existing and ongoing research to provide following answers.

Quantify the public investment in the infrastructure required to satisfy national goal for ITS deployment.

Explore the willingness of the private sector to invest in ITS based upon the expected public infrastructure deployment.

Link the benefits received to the cost required to deploy the infrastructure.

Determine the impact on the general economy of full investment in ITS technology.

Summarize the findings of the research to present a picture of the possibilities for, and impact of, deploying Intelligent Transportation Systems into the next decade.

**Project Location :** ITS America, Washington, DC

## **Partner(s) :**

ITS America is working in cooperation with the U.S. Department of Transportation's Joint Program Office to complete this analysis. Apogee Research, Inc., is the prime contractor with support from Wilbur Smith, and a team of advisors.

A steering committee and technical advisory committee comprised of other ITS stakeholder organizations will advise the scope and direction of this effort.

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**Start Date:** June 1996

**End Date:** December 1997

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$962,160

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## **Contacts:**

Joe Peters

USDOT ITS JPO, HVH-1

(202) 366-2202

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## ITS OPERATIONAL TEST META-EVALUATION

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### **Description:**

Although ITS operational tests include evaluations as an integral part, these evaluations are specific to the individual operational tests. To address national ITS program information needs, particularly those related to deployment decisions, additional information based on the comparison and analysis of inputs from all available information sources, including R&D, operational test results, and architecture efforts, is required. This project has provided meta-evaluation methodologies and applied those methodologies to address key questions of interest to FHWA in administering the national ITS program. Four studies have been conducted as part of this project. The various statistical approaches for the meta-evaluation of ITS user services were identified in a paper titled, "A Data Fusion Framework for Meta-evaluation of ITS System Effectiveness. A second study focused on the role of the incident detection component of freeway management systems and its role in the reduction of fatalities. This study was titled, "The Impact of Rapid Incident Detection on Freeway Accident Fatalities." In the third study, titled, "Reducing Accident Fatalities with Rural MAYDAY Systems," the impact of rural MAYDAY systems on rural roadway fatalities was examined. In the final study, titled "The Impact on Fatal Involvements of CVO User Services" the role of ITS CVO technologies in reducing fatal accidents involving commercial vehicles was examined.

**Project Location :** Washington, DC

**Contractor(s) :** Mitretek Systems

**Start Date:** April 1994

**End Date:** July 1996

**Estimated Total  
ITS Funds:** \$332,000

**Estimated Total  
Project Cost:** \$332,000

### **Contacts:**

Michael Freitas

FHWA - TFHRC, HSR-10

(703) 285-2128





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## MEASURING USER RESPONSE AT OPERATIONAL TESTS

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**Description:**

This effort had two parts: A seminar entitled "Applying Consumer Research Methods to ITS Challenges" and a guidebook to collecting and analyzing user response and market acceptance data. The project was undertaken primarily to support the evaluation of field operational tests, but had applicability to other deployment-oriented ITS programs such as the Early Deployment and Priority Corridors Programs. The seminar and guide provided an analytical framework to assist program managers and evaluators in defining critical user acceptance research objectives, structuring a suitable experimental design, and selecting appropriate research tools.

The Volpe National Transportation Systems Center produced the seminar "Applying Consumer Research Methods to ITS Challenges" on April 12-13, 1995, in Boston, MA. The guidebook was available in early 1997.

**Project Location :**

Cambridge, Massachusetts

**Contractor(s) :**

Volpe National Transportation Systems Center

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**Start Date:**

May 1994

**End Date:**

December 1995

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**Estimated Total  
ITS Funds:**

\$250,000

**Estimated Total  
Project Cost:**

\$250,000

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**Contacts:**

John O'Donnell

Volpe National Transportation Systems Center

(617) 494-3692

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## **VII. ARCHITECTURE, STANDARDS, AND NATIONAL COMPATIBILITY PLANNING**

## VII. ARCHITECTURE, STANDARDS, AND NATIONAL COMPATIBILITY PLANNING

**National ITS Architecture Development and Deployment.** In July 1996, the Architecture Team completed development of the National ITS Architecture. This effort has provided the supporting analysis, implementation strategy, and detailed requirements essential to accelerate the ITS standards development process. The National ITS Architecture, in conjunction with the developed standards, will supply the transportation and communications framework necessary for a nationally compatible intelligent transportation system.

The architecture program has identified interfaces between the system components, recommended the message sets and data that would be exchanged and that would need standards development, and has provided an implementation strategy for use by public and private sector transportation planners in developing their unique ITS systems. A thirtieth user service, highway-rail intersection warning, was fully integrated into the National ITS Architecture in January 1997. During 1998 a thirty-first service – the Archived Data User Service – was identified as a validated need by the highway planning community. This service is in the process of being addressed for incorporation into the National ITS Architecture by the end of FY 1999.

With the architecture development essentially complete, the focus has turned to ITS deployment support. The architecture will continue to be updated and maintained - based upon evolving standards, deployment experiences, and operational test results - and thus continue to support the further deployment of ITS systems throughout the country. Efforts have been undertaken to support both the Model Deployment Initiative Program and other ITS deployment efforts to foster standardization and compatibility between projects.

A major effort has been the support of the Standards Development Organizations, where the Architecture Team has been working with them in clarifying ITS standards requirements identified in the architecture and facilitating the effort to accelerate the development and approval of national standards.

Finally, an interactive architecture training course has been developed and conducted with nearly 60 presentations planned throughout the country next fiscal year. In addition, education, and technical assistance to the public and private sector from FHWA, with the use of the architecture development team, has begun to be conducted to aid in the total ITS planning and deployment process. Understanding the broad foundation provided by the National ITS Architecture is leading to an acceleration of ITS deployment nationwide, bringing us closer to the vision set by ISTEA and providing momentum for the implementation of TEA-21.

**Standards Development.** U.S. DOT currently is supporting a multi-year program designed to accelerate the development and implementation of ITS standards. The program supports the consensus-based, volunteer standards development process used by U.S. standards development organizations (SDOs). The program enables U.S. DOT to leverage significant volunteer resources in five of the SDOs and greatly facilitate the deployment of ITS.

U.S. DOT in coordination with ITS America, has examined the standards requirements identified in the National ITS Architecture and has identified those most needed to facilitate early deployments, especially for

the metropolitan infrastructure. These standards include key interface standards (e.g., message sets and data dictionaries), crosscutting standards (e.g., location referencing), and some safety standards. In certain cases, development of communications standards specific to ITS applications is required (e.g., dedicated short-range communications).

Top priority standards needs and requirements have been provided to the SDOs, together with near-term funding support, to facilitate the consensus standardization process. The development, approval, and adoption of non-proprietary, national ITS standards will accelerate ITS deployment by lowering the risk to both the public and the private sectors, facilitating expansion of the emerging ITS industry, and promoting national interoperability.

**National Compatibility Planning.** Research is being conducted in a number of ITS areas that are addressed in the architecture to demonstrate the technologies and prove their value in facilitating interoperability and compatibility. These areas include a detailed analysis of particular wireless and wireline communications technologies used with ITS systems as well as evaluations of the electromagnetic compatibility of various proposed communications components. Location referencing methods in use are being examined for their suitability to a national ITS and their applicability to supporting national interoperability. Finally, research is being conducted to support the development of a nationwide GPS augmentation infrastructure that will support the public safety aspects of ITS. These projects complement both the architecture development and the standards development efforts in support of the overall ITS program.

# **Research**

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## AUGMENTATION FOR GPS

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**Description:**

This project is a three phase effort that supports and facilitates the development of a nationwide GPS Augmentation infrastructure to provide the basic positioning system for the public safety aspects of ITS. Phase I analyzed the ability of available GPS Augmentation systems to meet user requirements. Recommendations for the most effective GPS Augmentation services were developed. Phase II is an in-depth analysis of the characteristics of the systems recommended under Phase I to determine if there are any technical issues that need resolution. This includes interference analysis, development of a system concept, and a tradeoff analysis of various technical parameters. Phase III is a study of the institutional and policy issues that need to be resolved upon implementation of the recommended GPS Augmentation system. Examples of these issues include liability in case of degraded system performance, and the impact on the user community, service providers and the commercial electronics industry as a whole. Several scenarios are to be examined including a privately installed, operated and maintained system, a publicly installed, operated and maintained system and various combinations of these two.

**Project Location :** Boulder, Colorado, Annapolis, Maryland; Rockville, Maryland

**Partner(s) :** Institute for Telecommunication Sciences and ARINC

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**Start Date:** February 1994

**End Date:** September 1999

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**Estimated Total  
ITS Funds:** \$2,430,000

**Estimated Total  
Project Cost:** \$2,755,000

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**Contacts:**

James Arnold

FHWA - TFHRC, HSR-10

(703) 285-2974

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## ELECTROMAGNETIC COMPATIBILITY TESTING FOR ITS

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**Description:**

A resource has been established to conduct evaluations of the electromagnetic compatibility of various proposed ITS communications components, operating singly and in combination. Many of the issues to be investigated will be drawn from the ITS System Architecture development effort. Sophisticated simulations, anechoic chambers, and antenna test ranges will be employed to perform this testing.

**Project Location :**

Colorado

**Contractor(s) :**

Institute for Telecommunication Sciences of the National Telecommunications and Information Administration

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**Start Date:**

June 1993

**End Date:**

November 2001

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**Estimated Total  
ITS Funds:**

\$2,850,000

**Estimated Total  
Project Cost:**

\$2,850,000

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**Contacts:**

James Arnold

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(703) 285-2974

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# INTELLIGENT TRANSPORTATION SYSTEMS (ITS) SPATIAL DATA INTEROPERABILITY

## **Description:**

Intelligent Transportation Systems (ITS) applications will require communication of locationally-referenced information. Location referencing methods such as linear, link, address, and coordinate based methods have been applied historically to limited geographic, functional, or organizational domains with homogeneous databases. ITS applications will be implemented over large domains, and will require location referencing in real time over communications links between dissimilar databases at central sites, at home or office, within travelway infrastructure, and in vehicles. By far the dominant requirements for location referencing are from those applications requiring vehicle tracking or location reporting, link travel time updates or other real-time information to vehicle navigation systems, and particular implementations assuming central-site generation of routes. This project will address these issues and accomplish the following:

- With the aid of the communities of interest involved, develop the specification of an appropriate and flexible interoperability protocol for ITS, based on the concept of the location reference message protocol (LRMS).
- Develop the specification for the ITS Datum, a database of ground control points, including a prototype national Datum for testing and evaluation process.
- Support appropriate standardization organizations to produce a national and international location referencing standard for ITS.
- Support a prototype testbed for the validation and verification of the LRMS and ITS Datum concepts in a realistic operation setting.
- Develop a testbed for the LRMS and the ITS Datum on the World Wide Web - for the testing of user compliance with regard to standards.
- Establish strategies and processes for implementing and maintaining the LRMS and ITS Datum, and users' manuals and aids.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Oak Ridge National Laboratory

**Start Date:** June 1995

**End Date:** September 2002

**Estimated Total  
ITS Funds:** \$1,579,500

**Estimated Total  
Project Cost:** \$1,579,500

## **Contacts:**

Mike Schagrin	USDOT ITS JPO, HVH-1	(202) 366-2180
Steven Gordon	Oak Ridge National Laboratory	(423) 576-8416





# INTELLIGENT TRANSPORTATION SYSTEM STANDARDS PROGRAM

## ***Description:***

The U.S. DOT ITS Joint Program Office's ITS Standards Program seeks to accelerate the development of ITS standards and to support their use by public sector agencies. Since its inception three years ago, the ITS Standards Program has been primarily involved in working with standards development organizations to facilitate the development of industry consensus-based standards. Within the next two years, most of the eighty-plus standards currently underway will be nearing completion and final publication. About twenty have been already published. Now the ITS Standards Program is increasing its scope to ensure that the standards are implemented as state and local governments plan and design future ITS-related transportation projects.

To help the standards to mature, to prove that they are technically sound in field use, and to encourage their acceptance by the user community, the ITS Standards Program has embarked on three new activities:

1. Ensure that the standards are technically sound and function in an operational environment.

The ITS Standards Program will bring together the stakeholders and will facilitate leadership to establish a structured and coordinated ITS standards testing program. The standards testing program is intended to build credibility and confidence in the standards. It will be a partnership among stakeholders that will develop test plans and procedures for testing ITS standards and will extract standards testing results from ITS deployments. Information on the reliability, functionality and performance of systems based upon the standards will be made available to the ITS community. Testing will also give feedback to the standards development organizations so that they can improve or update the standards.

2. Provide educational information to the ITS community about the standards.

Education will take the form of both awareness and training. Information notebooks for each standard will be prepared and distributed to public agencies. These notebooks will contain fact sheets on each standard, user guides, sample procurement language and specifications, and lessons learned. Classroom training will be available to people with different levels of technical expertise. The World Wide Web will be used to provide convenient access to resource materials.

3. Provide technical assistance to the public sector during implementation of the standards.

During initial implementation of the standards, issues of a technical nature may surface. The ITS Standards Program will provide limited assistance in the Peer-to-Peer Program as well as through support from the standards development organization committees.

***Project Location :*** Various



**Contractor(s) :** SAE; ASTM; IEEE; AASHTO, ITE

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**Start Date:** January 1996

**End Date:** October 2003

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**Estimated Total  
ITS Funds:** \$10,000,000

**Estimated Total  
Project Cost:** \$10,000,000

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**Contacts:**

Michael Schagrin

USDOT ITS JPO, HVH-1

(202) 366-2180

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# ITS COMMUNICATIONS ALTERNATIVES TEST AND EVALUATION

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**Description:**

Investigations into communications technologies and issues associated with ITS systems will be conducted. Activities will be focused upon identifying and analyzing particular communications technologies, which include wireless and wireline, for ITS functions. Investigations will also include communications protocol issues. Preferred communications alternatives will be recommended for specific ITS functions. Finally, a technical analysis of required quantity and location of spectrum will be completed.

**Project Location :**

Annapolis, Maryland

**Contractor(s) :**

ARINC

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**Start Date:**

July 1994

**End Date:**

January 1999

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**Estimated Total  
ITS Funds:**

\$3,981,847

**Estimated Total  
Project Cost:**

\$3,981,847

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**Contacts:**

James Arnold

FHWA - TFHRC, HSR-10

(703) 285-2974

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## NATIONAL ARCHITECTURE DEPLOYMENT SUPPORT

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**Description:**

A consensus national architecture has been developed to serve as the framework for Intelligent Transportation System's deployment. U.S. DOT has recognized the need for four major tasks to be accomplished to maximize the return on this investment. The first is to maintain the architecture in a current status, incorporating input from deployment programs throughout the country as well as emerging ITS standards. It is available on the World Wide Web and on CD ROM for the broadest and most user friendly distribution with Version 2.0 of the CD ROM, incorporating approximately 100 changes, available and distributed near the end of September 1998. The next version will incorporate a new archived data user service as well as updates in other areas of the architecture. It will thus continue to be the definitive and accurate reference for ITS deployment planning. The second task is to work with the Standards Development Organizations (SDOs) to ensure a major effort is accomplished in accelerating the ITS standards development and approval. This has involved active participation in SDO subcommittees drafting numerous ITS standards. The third task is to train transportation professionals, both public and private sector, on using the National ITS Architecture. More than 35 presentations to nearly 1000 persons were conducted throughout the country through FY 98 with nearly 60 presentations scheduled in FY 99. The fourth task is outreach – to provide support to the Model Deployment Initiative Program and other deployment programs, as well as to meet with public and private sector personnel across the transportation spectrum and assist in defining and explaining the National ITS Architecture and its benefits to users.

**Project Location :**

Manassas, Virginia and Anaheim, California

**Contractor(s) :**

Lockheed Martin Federal Systems and Odetics ITS

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**Start Date:**

August 1996

**End Date:**

August 2001

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**Estimated Total  
ITS Funds:**

\$10,635,000

**Estimated Total  
Project Cost:**

\$10,625,000

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**Contacts:**

Lee Simmons

USDOT ITS JPO, HVH-1

(202) 366-8048

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## **Completed Projects**

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## NATIONAL ARCHITECTURE DEVELOPMENT

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**Description:**

The National ITS Architecture has been developed to guide, not mandate, consistency among investors, purchasers, producers, and users in order to reduce the risk of incompatibility among the numerous intelligent transportation systems components to be manufactured and purchased in this industry. Phase I of the architecture development involved four industry teams, each producing an open national ITS architecture that provided the full set of ITS services (as defined in the National ITS Program Plan) while meeting critical ITS goals and objectives. In Phase II of the architecture development, two of the four teams were selected to resolve differences and develop the final national ITS architecture in an open, non-competitive process that allowed for outside input. Phase II has been completed and the single National ITS Architecture produced and documented. An additional user service, highway rail intersection (HRI), has been identified and was incorporated into the National ITS Architecture in January 1997.

The architecture development program, to include the HRI user service, has yielded a comprehensive set of standards requirements that have been forwarded to the ITS Standards Program Office and ITS-contracted Standards Development Organizations in order to accelerate ITS standards development.

**Project Location :** Manassas, Virginia and Anaheim, California

**Contractor(s) :** Lockheed Martin Federal Systems and Rockwell International Corporation

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**Start Date:** September 1993

**End Date:** January 1997

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**Estimated Total  
ITS Funds:** \$19,018,940

**Estimated Total  
Project Cost:** \$19,018,940

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**Contacts:**

Lee Simmons

USDOT ITS JPO, HVH-1

(202) 366-8048

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# SYSTEM ARCHITECTURE CONSENSUS BUILDING AND OUTREACH

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**Description:**

This project is the outreach arm of the effort to develop and analyze a system architecture and deployment strategy, to provide the foundation for nationally interoperable ITS.

Understanding the diverse needs of the many and varied ITS stakeholders was a prerequisite for successful development of an architecture that met the requirements laid out by the set of ITS User Services, as described in the National ITS Program Plan. The DOT and the contractors on this effort have been, and will continue to, work cooperatively to gauge and foster consensus on a nationwide deployment scenario for ITS, as advocated by the architecture development program. The partnership of contractors and DOT is referred to as the Consensus Building and Outreach Team.

Services provided under this contract include: working with DOT and architecture development contractors to develop material appropriate for outreach; arranging and facilitating task force and focus group meetings to discuss architecture, standards, and deployment issues identified by the architecture development program; coordination with the various State and Regional ITS Chapters to encourage their involvement in the process of determining stakeholders' concerns; and all general planning, advisory, and coordination support needed to accomplish the objectives of the consensus-building effort, namely: (1) to maximize responsiveness to concerned stakeholder groups; (2) to maximize coverage of the country; and (3) to schedule and execute activities in a timely manner to aid the architecture development contractors in producing each successive refinement of their products.

**Project Location :** Washington, DC

**Contractor(s) :** Part of this effort has been incorporated as part of the ITS America cooperative agreement. Other pieces of the program will be executed as separately funded task orders with ITS America, TRESP & Associates, and others during the course of the program.

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**Start Date:** October 1992

**End Date:** July 1996

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**Estimated Total  
ITS Funds:** \$1,500,000

**Estimated Total  
Project Cost:** \$1,500,000

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**Contacts:**

William Jones

USDOT ITS JPO, HVH-1

(202) 366-2128

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## **VIII. MAINSTREAMING**



## **VIII. MAINSTREAMING**

The strategy for deployment of ITS emphasizes “mainstreaming” in the planning process, educating, training, providing technical assistance, and achieving “buy in” and application at the state and local levels.

### **A. Deployment Planning**

The existing planning and programming process for transportation improvements is well-established, and includes procedures for considering an area’s long-range needs, environmental issues, and creation of a specific program of projects for funding. In order to contribute to transportation improvements, ITS solutions must become part of the set of alternatives being considered. U.S. DOT has 90 early deployment planning studies completed or underway. Merging ITS into the planning process and offering innovative ways for state and local governments to acquire ITS solutions is critical to the success of the ITS program.

### **B. Deployment Support**

The deployment support objectives include: (1) bringing together, in a series of workshops, public and private sector professionals to discuss practical solutions to problems which may be encountered in the deployment of ITS; (2) providing technical assistance through information exchange in peer-to-peer workshops and through technology transfer; and (3) identifying and carrying out activities needed to effectively promote ITS in the state and metropolitan planning processes, to educate the ITS community as to how those processes work, and to educate those involved in regional planning regarding ITS.

### **C. Professional Capacity Building (PCB)**

In order to support the deployment of ITS, it is imperative that the technical capacity of transportation professionals at a variety of institutional levels be expanded. Focusing initially on federal employees and engaging state and local professionals, the Professional Capacity Building program will support the national ITS program by:

- Increasing knowledge about ITS benefits and deployment options among decision makers;
- Expanding the technical skills and capabilities of public sector implementing and support agencies;
- Developing an education and training infrastructure at multiple levels, including colleges, universities, public agencies, and commercial providers.

# **Research and Development**

## DEVELOPMENT OF ADVANCED EDUCATIONAL TECHNIQUES FOR ITS

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**Description:** This project will develop three training courses. Target audiences will be identified, then training objectives will be developed in cooperation with the National Highway Institute (NHI) identified experts. Advanced ITS tools will be utilized in developing and presenting the courses. The training courses will be coordinated with related courses under development by NHI and the JPO.

**Project Location :** Troy, New York

**Contractor(s) :** Rensselaer Polytechnic Institute

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**Start Date:** October 1998

**End Date:** March 2000

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**Estimated Total  
ITS Funds:** \$494,646

**Estimated Total  
Project Cost:** \$593,575

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**Contacts:**

David Gibson	FHWA, TFHRC, HSR-10	(202) 285-2407
William A. Wallace	Rensselaer Polytechnic Institute	(518) 276-6854

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# **Early Deployment Planning**

# AKRON, OHIO METROPOLITAN AREA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Akron, Ohio area will focus its initial efforts on the feasibility of traffic management on the regional freeway and feeder systems. The central traffic control system and a roadside/roadway system will define the infrastructure necessary to support and influence the interaction of the various functional subsystems of ITS including an Advanced Traffic Management System, an Advanced Traveler Information System, the Commercial Vehicle Operations, and Advanced Public Transportation Systems.

**Project Location :** Akron, Ohio

**Partner(s) :** Akron Metropolitan Area Transportation Study (AMATS)

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**Start Date:** October 1996

**End Date:** June 1999

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Jim Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
Kenneth Hanson	AMATS	(330) 375-2436

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# BALTIMORE, MARYLAND EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Baltimore Metropolitan Council, in cooperation with Maryland State Highway Administration, is conducting an Early Deployment Project for Metropolitan Baltimore that will be done in two phases: (1) ITS User Services Plan and ITS Strategic Deployment Plan, and (2) a Detailed Implementation Plan including an initial deployment of one or more high priority user services. The Baltimore Metropolitan Area, which includes Baltimore City, and Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, accounts for about 50% of Maryland's total population, business establishments and economic activity.

**Project Location :** Baltimore, Maryland

**Partner(s) :** MSHA and Baltimore Metropolitan Council

**Start Date:** June 1995

**End Date:** June 1999

**Estimated Total  
ITS Funds:** \$456,000

**Estimated Total  
Project Cost:** \$570,000

## **Contacts:**

Tom Jacobs	FHWA Maryland Division, HB-MD	(410) 962-4342	Ext. 129
Eileen Singleton	Baltimore Metropolitan Council	(410) 333-1750	Ext. 236



# FORT LAUDERDALE, FLORIDA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Florida Department of Transportation, in cooperation with the Broward County Government, is conducting an early deployment planning study that will allow for a comprehensive ITS assessment and develop an areawide strategic ITS deployment plan for the Fort Lauderdale area.

**Project Location :**

Fort Lauderdale, Florida

**Partner(s) :**

Florida DOT

**Start Date:**

September 1996

**End Date:**

March 1999

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

**Contacts:**

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693
William A. Lewis, P.E.	Florida DOT, District 4	(954) 777-4110



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## HARRISBURG/LEBANON/CARLISLE, PENNSYLVANIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:** The Pennsylvania Department of Transportation is sponsoring an early deployment planning study that will develop a strategic deployment plan for ITS technologies which will address the needs of the Harrisburg/Lebanon/Carlisle Metropolitan area.

**Project Location :** Harrisburg/Lebanon/Carlisle, Pennsylvania

**Partner(s) :** Pennsylvania DOT

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**Start Date:** November 1996

**End Date:** September 1999

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**Estimated Total  
ITS Funds:** \$320,000

**Estimated Total  
Project Cost:** \$400,000

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### Contacts:

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517
Steve Koser	Pennsylvania DOT	(717) 705-1443

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# NEWARK, NEW JERSEY EARLY DEPLOYMENT PLANNING STUDY

**Description:** The City of Newark, in cooperation with the New Jersey Department of Transportation, is conducting an early deployment study that will develop a strategic deployment plan for ITS technologies which will address the needs of the Newark metropolitan area.

**Project Location :** Newark, New Jersey

**Partner(s) :** City of Newark, New Jersey DOT

**Start Date:** September 1996

**End Date:** September 1999

**Estimated Total  
ITS Funds:** \$280,000

**Estimated Total  
Project Cost:** \$350,000

## Contacts:

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Bahman Izadmehr	City of Newark	(973) 733-3985



# NEW HAVEN-MERIDEN, CONNECTICUT EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study is developing a comprehensive ITS strategic deployment plan which responds to near-term I-95 and I-91 corridor needs, and maximizes transportation system effectiveness given a basic supply/demand imbalance. It also complements related efforts in the state and the northeast, and provide a building block for broader mid-range ITS applications in the region.

**Project Location :**

New Haven-Meriden, Connecticut

**Partner(s) :**

Connecticut DOT and South Central Regional Council of Governments (SCRCOG)

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**Start Date:**

June 1996

**End Date:**

February 1999

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**Estimated Total  
ITS Funds:**

\$350,000

**Estimated Total  
Project Cost:**

\$437,500

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**Contacts:**

Bob Ramirez	FHWA Connecticut Division	(860) 659-6703	Ext. 3004
Hal Decker	Connecticut DOT	(860) 594-2636	

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# NEW YORK CITY, NEW YORK EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study is developing a coordinated areawide Early Deployment Plan that addresses both the safety/personal security and mobility/accessibility needs of the NYC Region. The plan emphasizes the application of ITS to highways, as well as transit and other multi modal elements. The plan also coordinates and complements other ITS related projects and planning efforts on both the highway and transit systems.

**Project Location :** New York, New York

**Partner(s) :** New York DOT

**Start Date:** March 1995

**End Date:** February 1999

**Estimated Total  
ITS Funds:** \$750,000

**Estimated Total  
Project Cost:** \$2,500,000

**Contacts:**

Arthur O'Connor	FHWA/FTA NYC Metro Office	(212) 466-3856
Fred Lai	New York State DOT	(718) 482-4733



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## PHILADELPHIA, PENNSYLVANIA INSTITUTIONAL COORDINATION STUDY

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**Description:**

The purpose of this project is to accelerate the development and application of the appropriate institutional cooperative agreements and coordination network for the exchange of vital intermodal transportation related information utilizing existing and future ITS technologies in place within the I-95 corridor and the Philadelphia metropolitan area. This project will build on the framework of the advanced traffic and incident management systems developed by Pennsylvania DOT. The focus of the project is to further develop the intermodal regional and area wide coordination activities proposed in the traffic and incident management systems and implemented under the traffic and incident management systems Early Action Program Projects.

**Project Location :** Philadelphia, Pennsylvania

**Partner(s) :** Pennsylvania DOT/Delaware Valley Regional Planning Commission

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**Start Date:** July 1994

**End Date:** August 1999

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Carmine Fiscina

FHWA/FTA Philadelphia Metro Office

(215) 656-7111

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# SAN JUAN, PUERTO RICO AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Commonwealth of Puerto Rico is investigating the feasibility of implementing various ITS technologies throughout the San Juan metropolitan area to reduce congestion while maximizing the utility of all its transportation modes. The plan includes interaction with the proposed light-rail mass transit system to be constructed within the next decade.

**Project Location :** San Juan, Puerto Rico

**Partner(s) :** Puerto Rico DOT

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**Start Date:** September 1993

**End Date:** January 1999

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Eddie Rivera

FHWA, Puerto Rico Division

(809) 766-5600

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# SPRINGFIELD, MASSACHUSETTS EARLY DEPLOYMENT PLANNING STUDY

**Description:**

This study will produce an ITS strategic plan for the Springfield region that is consistent, compatible, and integrable with statewide and regional transportation planning studies. It will outline a vision aimed at smoothing intermodal linkages, integrating the intra-regional transportation system, and promoting a coordinated deployment of user services that will avoid costly duplicative efforts.

**Project Location :**

Springfield, Massachusetts

**Partner(s) :**

Massachusetts Highway Department

**Start Date:**

March 1995

**End Date:**

January 1999

**Estimated Total  
ITS Funds:**

\$350,000

**Estimated Total  
Project Cost:**

\$437,500

**Contacts:**

Edward Silva	FHWA Massachusetts Division, HDA-MA	(617) 494-2253
Steve Pepin	Massachusetts EOTC	(617) 973-8051



# SYRACUSE, NEW YORK EARLY DEPLOYMENT PLANNING STUDY

**Description:** This study will establish a comprehensive strategic plan for the coordinated areawide deployment of ITS for the Syracuse area transportation system. The plan will also identify early action projects that will provide immediate benefits and form the foundation for a comprehensive areawide traffic management system.

**Project Location :** Syracuse, New York

**Partner(s) :** New York State DOT

**Start Date:** March 1995

**End Date:** March 2000

**Estimated Total  
ITS Funds:** \$350,000

**Estimated Total  
Project Cost:** \$437,500

## Contacts:

Jerry Zell	FHWA New York Division, HTD-NY	(518) 431-4129	Ext. 228
Jim Lawler	New York State DOT	(315) 428-4312	



## TOLEDO, OHIO EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study will seek to find the most appropriate ITS technology that would yield maximum benefit to the users. The ITS technology categories that will be the focus of the study will include Advanced Traffic Management Systems, Advance Traveler Information Systems, Commercial Vehicle Operations, and Advanced Public Transportation Systems. Major emphasis will be placed on finding the most appropriate ITS technology to solve the most critical problems of the Toledo region.

**Project Location :**

Toledo, Ohio

**Partner(s) :**

Toledo Metropolitan Area Council of Governments (TMACOG)

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**Start Date:**

October 1996

**End Date:**

June 1999

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**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

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**Contacts:**

Jim Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
William L. Knight	TMACOG	(419) 241-9155

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# YOUNGSTOWN-WARREN, OHIO EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The focus of this planning effort will center on the study and development of feasible alternatives for regional traffic management systems applicable to the local highway network. A strategic plan will be prepared for the Youngstown-Warren area to guide the implementation of transportation system operation projects on an area-wide scale. The plan will address ITS user services to increase safety, reduce motorist delays, reduce air pollution, and improve the overall efficiency of vehicle operations through the use of advanced surveillance, communications, navigation, sensors, control strategies, traveler interface, and data processing.

**Project Location :** Youngstown-Warren, Ohio

**Partner(s) :** Eastgate Development & Transportation Agency

**Start Date:** October 1996

**End Date:** June 1999

**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$250,000

## **Contacts:**

Jim Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
John Getchey	EDATA	(330) 746-7601



# **Deployment Support**

# INCORPORATING ITS INTO REGIONAL TRANSPORTATION PLANNING

## **Description:**

This four-year study began by examining current transportation planning methods used by MPOs and implementing agencies to address ITS deployment, particularly in the alternatives analysis stage. If such methods are inadequate, new approaches will be developed. The resulting methods shall be applied to two case studies. The case studies will cover an area or region, rather than a single traditional project. The range of transportation improvement projects considered will include construction of new roads or lane miles, conventional signage or signal installations, transit improvements, Transportation Demand Management (TDM) measures, Advanced Traveler Information Systems, Advanced Traffic Management Systems, and Advanced Public Transportation Systems.

Phase I of this project was completed on 30 June 1996. The two cases studied were Houston, TX, and Seattle, WA. An analysis of the approach and methods used by the MPO's in these areas to select among projects as part of the Transportation Improvement Process (TIP) was conducted. A report was produced that documented this process and provided some recommendations for how to deal with ITS projects as part of the TIP. Based on the results of this phase the Seattle area was selected for a more detailed analysis of how to include and evaluate ITS enhancements to traditional highway construction projects. In Phase II, Mitretek initiated a modified Major Investment Study (MIS) type analysis to develop methods and techniques to evaluate transportation improvement alternatives, including alternatives with ITS enhancements. As part of Phase II, the analysis framework was defined and published in two reports, "Incorporating ITS into Corridor Planning Seattle Case Study," (March 1998). The Phase II report will be revised based on comments received from DOT. This study is expected to be completed in June 1999 with finalizing the analysis results and a report on these methods for use by transportation planners.

**Project Location :** Washington, DC

**Contractor(s) :** Mitretek Systems

**Start Date:** July 1995

**End Date:** June 1999

**Estimated Total  
ITS Funds:** \$1,613,000

**Estimated Total  
Project Cost:** \$1,613,000

## **Contacts:**

Mac Lister

USDOT ITS JPO, HVH-1

(202) 366-9292



## ITS PROFESSIONAL CAPACITY BUILDING

### **Description:**

The purpose of this program is to provide essential education and training programs for Federal, state and local agency professionals and for elected officials and the general public concerning the deployment of Intelligent Transportation Systems. The activities are multimodal and multilevel in nature, incorporating awareness programs, technical training, and education programs at the undergraduate and graduate levels. By the year 2000, it is anticipated that elected officials and the general public will understand the value and applications of ITS components, and that there will be sufficient numbers of trained U.S. DOT, state and local ITS professionals in place. It is also anticipated that sufficient numbers of trained professionals will be entering the work force and that comprehensive, multi-disciplinary programs will be in place.

The "Five Year Strategic Plan for Professional Capacity Building for ITS Transportation Management and Traveler Information Services" was issued in March 1996. Since early 1997, a series of seven awareness seminars and four short courses were given to over 5000 Federal, State and local participants in over 200 presentations of seminars and courses. Additional education and training activities in FY 1999 will continue to be designed to systematically encourage, enhance and leverage opportunities for programs at all levels. An Implementation Plan is available to provide details on such programs, with budgets and priorities established to implement the most effective strategies. Seminars, short courses and workshops are offered in subject areas such as ITS Awareness, ITS and The Transportation Planning Process, ITS Public/Private Partnerships, ITS and Telecommunications, ITS and Transit, and Applying the National ITS Architecture to Deployment.

### **Project Location :**

Washington, DC; FHWA Region and Division Offices, FTA Region Offices, State and Local government agencies

### **Contractor(s) :**

Various

### **Start Date:**

September 1996

### **End Date:**

On-going

### **Estimated Total ITS Funds:**

\$4,000,000

### **Estimated Total Project Cost:**

\$4,000,000

### **Contacts:**

Tom Humphrey	USDOT ITS JPO, HVH-1	(202) 366-2211
Larry Swartzlander	FHWA Headquarters, HTV-3	(202) 366-6066
Ron Boenau	FTA Headquarters, TRI-11	(202) 366-0195



# NIAGARA INTERNATIONAL TRANSPORTATION TECHNOLOGY COALITION

## **Description:**

Using a revolving loan fund to finance the NITTEC Program, the many agencies and jurisdictions which own and operate the Niagara River Border Crossings and the major approaches to those crossings will establish a multiagency transportation coordination and management council to:

- a) Develop regionally compatible travel information and traffic management strategies (e.g., non-stop electronic customs processing, ETTM);
- (b) Establish a Regional Transportation Management Center to monitor regional traffic and coordinate traffic management strategies (e.g., incident management and tourist/travel information service); and
- (c) Help finance operating and capital improvements by operating agencies to expedite the movement of traffic across and to the border.

## **Project Location :**

Buffalo/Niagara Region

## **Partner(s) :**

New York State DOT, New York Thruway Authority, Niagara Falls Bridge Commission, Buffalo and Fort Erie Peace Bridge Authority, Ministry of Transportation Ontario, and other local agencies

## **Start Date:**

December 1995

## **End Date:**

On-going

## **Estimated Total ITS Funds:**

\$2,500,000

## **Estimated Total Project Cost:**

\$5,000,000

## **Contacts:**

Jerry Zell	FHWA, New York Division HTS-NY	(518) 431-2125	Ext. 228
Robert Russell	New York State DOT, HTD-NY Buffalo Region	(716) 847-3238	



# **CVO Deployment Support**

## ITS/CVO TECHNOLOGY TRUCK

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### **Description:**

The ITS/CVO technology truck project goal is to create a national demonstration project -- using an 18-wheeler designed and constructed to house portable ITS technology, classroom-type facilities, and informational kiosks -- in the area of CVO designed to demonstrate, educate, and inform state agencies and motor carrier communities regarding the technologies and potential benefits of the ITS/CVO program. The program will also serve as a method of introducing ITS/CVO technology to the secondary audiences -- motor carrier safety enforcement officers, motor vehicle operators (truck/bus drivers), transportation students and the general public by providing hands-on demonstrations as well as interactive, multi-media based informational presentations.

**Project Location :** Oak Ridge, Tennessee

**Contractor(s) :** Oak Ridge National Laboratory

**Start Date:** February 1995

**End Date:** September 1999

**Estimated Total  
ITS Funds:** \$1,600,000

**Estimated Total  
Project Cost:** \$1,600,000

### **Contacts:**

John McCracken	FHWA - OMC, HTA-32	(202) 366-2219
Zeborah English	FHWA - OMC, HSA-20	(202) 366-0398



## **Completed Projects**



## ALLENTOWN/BETHLEHEM/EASTON, PENNSYLVANIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:** The Pennsylvania Department of Transportation conducted an early deployment study that will develop a strategic deployment plan for ITS technologies which will address the needs of the Allentown/Bethlehem/Easton Metropolitan area.

**Project Location :** Allentown/Bethlehem/Easton, Pennsylvania

**Partner(s) :** Pennsylvania DOT

**Start Date:** November 1996

**End Date:** November 1998

**Estimated Total  
ITS Funds:** \$320,000

**Estimated Total  
Project Cost:** \$400,000

### Contacts:

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517
Steve Koser	Pennsylvania DOT	(717) 705-1443



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# ATLANTA, GEORGIA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This project developed an integrated, multi-modal, statewide ITS Strategic Deployment Plan for implementation of ITS technologies using the on-going Atlanta projects as a foundation. The plan recommended a list of projects for implementation, provided a staged implementation plan, and identified potential public and private funding sources. The plan also maintained sufficient flexibility to incorporate emerging technologies.

**Project Location :**

Atlanta, Georgia

**Partner(s) :**

Georgia DOT, Georgia Tech Research Institute

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**Start Date:**

October 1994

**End Date:**

March 1998

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**Estimated Total  
ITS Funds:**

\$450,000

**Estimated Total  
Project Cost:**

\$600,000

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**Contacts:**

Stephanie Kolb

FHWA Georgia Division, HDA-GA

(404) 562-3655

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# AUSTIN, TEXAS AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

**Description:** The City of Austin and the Texas Department of Transportation jointly developed both short- and long-range objectives for the implementation and deployment of ITS technologies throughout the metropolitan Austin area.

**Project Location :** Austin, Texas

**Partner(s) :** Texas DOT

**Start Date:** June 1993

**End Date:** March 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## Contacts:

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Bubba Needham	Texas DOT - Austin District	(512) 832-7053
Walt Daniel	Texas DOT - TRF (Austin)	(512) 416-3158



# BATON ROUGE, LOUISIANA EARLY DEPLOYMENT PLANNING STUDY

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**Description:** The Louisiana Department of Transportation and Development and the Capital Region Planning Commission developed a master plan for Intelligent Transportation Systems in the Baton Rouge metropolitan area. The study included evaluation of existing and future traffic control capabilities and incident management considerations.

**Project Location :** Baton Rouge, Louisiana

**Partner(s) :** Louisiana Department of Transportation and Development

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**Start Date:** August 1997

**End Date:** September 1998

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**Estimated Total  
ITS Funds:** \$170,000

**Estimated Total  
Project Cost:** \$329,140

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## Contacts:

Seve Serna	FHWA Louisiana Division, HDA-LA	(504) 389-0251
Chris Orillion	Louisiana DOTD	(504) 358-9102

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# BIRMINGHAM, ALABAMA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Alabama Department of Transportation developed an ITS/Congestion Management Program for the Birmingham metropolitan area. The consultant worked with a State-selected Oversight Committee comprised of State, City, County, and private sector personnel. The consultant identified levels of congestion on freeways and other highways of national significance recommending short-term and long-term measures and ITS strategies to alleviate congestion. The program described the needs, the applicable ITS user services, the functional requirements, the system architecture, implementation issues, the cost effectiveness, and the performance monitoring plan. As a result of this study, the State is developing plans for a computerized traffic signal upgrade, fiber optic cable communications, and camera surveillance/detection system. Also, freeway service patrols began in the first half of 1997.

**Project Location :** Birmingham, Alabama

**Partner(s) :** Alabama DOT

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**Start Date:** February 1994

**End Date:** January 1996

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Bill Van Luchene

FHWA Alabama Division, HDA-AL

(334) 223-7379

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# BOSTON, MASSACHUSETTS AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:** The Early Deployment study resulted in a two-phased conceptual ITS plan for the Boston Metropolitan area for the years 1995 and 2000. The 1995 plan is the short-range plan consisting of the latest state-of-the-practice technologies. The long-range plan for the year 2000 includes advanced and promising technologies. The study also recommended organizational changes needed to manage the recommended ITS program.

**Project Location :** Boston, Massachusetts

**Partner(s) :** Massachusetts Highway Department

**Start Date:** May 1992

**End Date:** January 1994

**Estimated Total  
ITS Funds:** \$360,000

**Estimated Total  
Project Cost:** \$450,000

## Contacts:

Edward Silva	FHWA Massachusetts Division	(617) 494-2253
Steve Pepin	Massachusetts EOTC	(617) 973-8051



# BUFFALO/NIAGARA FALLS, NEW YORK AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The area's coordinated effort developed a strategic plan for area-wide deployment of Intelligent Transportation Systems (ITS). The study followed the FHWA's User Services/ITS Planning and Deployment Process. Key elements of the study included:

- Establishing the coalition of key stakeholders;
- Developing an area-wide Strategic Plan based on the area's unique user service needs;
- Identifying key early implementation projects;
- Developing a Phased Implementation Plan with timetable and funding availability;
- Identifying/quantifying operations and maintenance resource needs;
- Identifying needed institutional arrangements;
- Establishing public outreach programs.

In order to keep the ITS design/deployment process moving as efficiently as possible, the consultant study contract was established with a mechanism to proceed directly into project design. In addition to the \$2 million earmark for deployment, New York State Department of Transportation has programmed more than \$10 million in its five year capital program for ITS activities for the Buffalo area. Early action projects for the area include establishment of an interim traffic management center, development and support of an incident management team, and deployment of portable changeable message signs and highway advisory radio.

**Project Location :** Buffalo/Niagara Falls, New York

**Partner(s) :** New York State DOT

**Start Date:** September 1993

**End Date:** June 1997

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$784,000

## **Contacts:**

Jerry Zell	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 228
Ed Roberts	New York State DOT	(518) 457-1232	
Dean Gustafson	New York State DOT	(716) 847-3669	



# CHARLESTON, SOUTH CAROLINA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Early Deployment Study identified methods for implementing new technologies to manage and reduce congestion in Charleston, South Carolina. There are five project tasks.

Task 1: Identify routes and sources of potential congestion.

Task 2: Identify and recommend traffic operations systems techniques which may be used to detect and monitor traffic conditions.

Task 3: Recommend traffic operations system and management techniques which may be utilized to mitigate congestion.

Task 4: Recommend the method of monitoring, the physical facilities, the location of this control, and the equipment and staffing requirements.

Task 5: Prepare plans, specifications and estimates to procure and construct those devices, techniques, methods or processes.

## **Project Location :**

Charleston, South Carolina

## **Partner(s) :**

South Carolina DOT

## **Start Date:**

September 1992

## **End Date:**

June 1997

## **Estimated Total ITS Funds:**

\$320,000

## **Estimated Total Project Cost:**

\$400,000

## **Contacts:**

Steve Ikerd

FHWA South Carolina Division, HDA-SC

(803)253-3885

Pat Harrison

South Carolina DOT

(803)737-1456





# CHARLOTTE, NORTH CAROLINA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The overall project for the Charlotte metropolitan area, titled "Congestion Avoidance and Reduction for Autos and Trucks", or CARAT, incorporated elements of Advanced Traffic Management Systems, Advanced Traveler Information Systems and Commercial Vehicle Operations for the greater Charlotte/Mecklenberg area. The project was implemented in phases. The phase I initiative consisted of the development and operation of a freeway management system for a 15.2-mile section of I-77. Subsequent phases of the project extended surveillance and control to a total of 360 miles of freeways in the Charlotte urban area.

The Early Deployment Planning study focused primarily on development of the functional specifications for the regional traffic management system.

The full project report described the fundamental system elements necessary to implement this regional traffic management system in the greater Charlotte area. Analyses of the alternative technologies and strategies were presented as a basis for the recommendations. Where appropriate, functional specifications were included for use in the preparation of final design documents.

**Project Location :** Charlotte, North Carolina

**Partner(s) :** North Carolina DOT

**Start Date:** June 1992

**End Date:** December 1993

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Max Tate

FHWA North Carolina Division, HDA-NC

(919) 856-4354



# CHICAGO, ILLINOIS AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This feasibility and planning study developed and documented an integrated, multi-modal, areawide ITS multi-year strategic deployment plan for implementation of ITS user services and technologies incorporating and integrating the existing, extensively deployed, multi-modal ITS infrastructure within the Chicago metropolitan planning area. The plan recommended a list of projects for implementation, provided a staged implementation plan and identified potential public and private funding sources. The plan also maintained sufficient flexibility to incorporate emerging technologies. Although the study primarily addressed the freeway, expressway and tollway systems and the public transit systems, appropriate strategic regional arterials were also addressed. The IVHS Planning and Project Deployment Process was utilized and consistency was achieved with the National ITS Program Plan, Intelligent Transportation Infrastructure and national ITS architecture development process. The study was also closely integrated with the Gary-Chicago-Milwaukee (GCM) ITS Priority Corridor Initial and Updated Program Plans. The consultant (TransCore) for the study began work in early 1997.

A multimodal Advanced Technology Task Force has been established by CATS to oversee development and implementation of the strategic early deployment plan for northeastern Illinois. Approximately 15 of 17 tasks have been completed, including the following deployment action memoranda: Existing Transportation Systems, Problems and Opportunities, User Services Plan (includes 25 candidate actions), ITS-Related Activities in the Region, Alternative ITS Technologies, Regional ITS: Status and Perspectives, Immediate Deployment Action Plan (includes 4 immediate actions), Regional ITS Architecture, Strategy for Regional ITS Integration, Long Range Visions for ITS in Northeastern Illinois and Regional ITS Deployment Action Plan.

## **Project Location :**

Chicago, Illinois

## **Partner(s) :**

Chicago Area Transportation Study (CATS), Illinois DOT, Illinois State Toll Highway Authority (ISTHA), Regional Transportation Authority (RTA), and Chicago DOT

## **Start Date:**

July 1995

## **End Date:**

October 1998

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Pete Olson

FHWA Illinois Division, HPP-IL

(217) 492-4634

David Zavattero

CATS

(312) 793-0360



# CLEVELAND, OHIO AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The purpose of this project was to develop a traffic surveillance and control system feasibility study for the Cleveland metropolitan area. The consultant prepared a Strategic Deployment Plan focusing on the freeway/expressway system and an Incident Management Plan. The Strategic Deployment Plan identified the user service requirements in the study region, the user service objectives based on these requirements, the functions required to support the user services, and defined the system architecture.

**Project Location :** Cleveland, Ohio

**Partner(s) :** Ohio DOT

**Start Date:** September 1993

**End Date:** October 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

James Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
Dale Schiavoni	Ohio DOT	(216) 581-2100



## COLUMBUS, OHIO EARLY DEPLOYMENT PLANNING STUDY

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### **Description:**

The project was a feasibility study of an interface between traffic signal control systems and the freeway management system in Columbus, Ohio. These systems are currently operating independently. The Mid-Ohio Regional Planning Commission proposed to interface the systems in order to maximize efficiency of traffic operations in the Columbus area. The result of this study provided a working model of the interface between the systems.

### **Project Location :**

Columbus, Ohio

### **Partner(s) :**

Ohio DOT and Mid-Ohio Regional Planning Commission (MORPC)

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### **Start Date:**

August 1995

### **End Date:**

August 1997

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### **Estimated Total ITS Funds:**

\$188,000

### **Estimated Total Project Cost:**

\$235,000

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### **Contacts:**

James Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
Ahmad Al-Akhras	Mid-Ohio Regional Planning Commission	(614) 228-2663

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# DALLAS, TEXAS AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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## **Description:**

The purpose of the Dallas area-wide ITS plan was to improve mobility, safety, and productivity. The goals of the plan were to:

- Coordinate with public and private sectors to collect and disseminate real-time information on traffic and transit conditions.
- Optimize transportation system operations by coordinating operations among governmental agencies.
- Encourage transit and High Occupancy Vehicle (HOV) usage.

These goals are being addressed through six objectives with specific tasks associated with each objective.

1. Establish a broadly-based Steering Committee with representatives from multiple agencies.
2. Assess the existing transportation management and communications linkages and investigate the potential application of ITS technologies.
3. Identify institutional and legal barriers to coordination and recommend solutions.
4. Produce an integrated, area-wide multi modal, multi-jurisdictional ITS plan while maintaining flexibility to incorporate emerging technologies.
5. Develop project evaluation criteria, costs and benefits, priorities, and staged implementation plan.
6. Define projects for implementation, prepare proposals, and identify private and public funding sources.

**Project Location :** Dallas, Texas

**Partner(s) :** Texas DOT

**Start Date:** September 1992

**End Date:** October 1996

**Estimated Total  
ITS Funds:** \$600,000

**Estimated Total  
Project Cost:** \$750,000



**Contacts:**

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Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Terry Sams	Texas DOT, Dallas District	(214) 320-6231
Walt Daniel	Texas DOT, TRF (Austin)	(512) 416-3158
Jim Carvell	Texas Transportation Institute	(214) 691-8124
Carol Walters	Texas Transportation Institute	(817) 261-1661

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# DAYTON/SPRINGFIELD, OHIO AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

**Description:**

The purpose of this project was to develop a traffic surveillance and control system feasibility study for the Dayton/Springfield metropolitan area. A consultant developed a strategic deployment plan that identified the needs for the area and the strategies to meet those needs.

**Project Location :**

Dayton/Springfield, Ohio

**Partner(s) :**

Ohio DOT and Miami Valley Regional Planning Commission (MVRPC)

**Start Date:**

August 1995

**End Date:**

September 1997

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

**Contacts:**

James Buckson	FHWA Ohio Division, HDA-OH	(614) 280-6846
Anne Hassoun	MVRPC	(937) 223-6323



# DENVER, COLORADO AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This Early Deployment Planning Project developed an Intelligent Transportation Systems Strategic Plan for the Denver Metropolitan Area. The plan, covering the next 10 years, selects a smart corridor and provides a guide for the implementation and deployment of ITS technologies in this corridor, as well as throughout the metro area. Phase I was completed April 30, 1995. Phase II will be completed as part of the Denver, Colorado Preliminary Engineering Early Deployment Planning Study.

**Project Location :** Denver, Colorado

**Partner(s) :** Colorado DOT

**Start Date:** December 1991

**End Date:** April 1993

**Estimated Total  
ITS Funds:** \$213,000

**Estimated Total  
Project Cost:** \$316,000

## **Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
John Kiljan	Colorado DOT	(303) 512-5858	





# DENVER, COLORADO PRELIMINARY ENGINEERING EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Colorado DOT developed an Intelligent Transportation System Strategic Plan for the Denver Metropolitan Area. The plan provides a guideline for the implementation of ITS technologies during the next 10 years. One of the first recommendations was to develop and implement an Advanced Traffic Management System (ATMS) as the focal point for multi-agency and public/private sector traffic management and ITS activities. This early deployment planning project developed the preliminary design of the ATMS and the field elements that are needed to support the system's functions. The Colorado DOT (CDOT) is continuing with a follow on project to complete the design and implementation of the ATMS using a design/build procurement.

**Project Location :** Denver, Colorado

**Partner(s) :** Colorado DOT

**Start Date:** August 1992

**End Date:** June 1997

**Estimated Total  
ITS Funds:** \$500,000

**Estimated Total  
Project Cost:** \$625,000

## **Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
Joni Brooks	Colorado DOT	(303) 757-5805	



# DES MOINES, IOWA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

**Description:** The objective of this study was to develop a strategic plan for deployment of ITS user services in the Des Moines metropolitan area. The study, conducted for the Iowa DOT by the Center for Transportation Research and Education, provided a framework for incorporating ITS into the metropolitan area's long-improvement program.

**Project Location :** Des Moines, Iowa

**Partner(s) :** Iowa DOT and the Des Moines MPO

**Start Date:** March 1995

**End Date:** December 1997

**Estimated Total  
ITS Funds:** \$275,000

**Estimated Total  
Project Cost:** \$343,750

## Contacts:

Jim Hogan	FHWA Iowa Division, HDA-IA	(515) 233-7305
Tim Crouch	Iowa DOT	(515) 239-1545
Tom Maze	CTRE	(515) 294-8103



# DETROIT, MICHIGAN AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Michigan Department of Transportation prepared a comprehensive deployment plan addressing the issues related to an upgrade and expansion of the existing 32.5-mile Advanced Traffic Management Systems (ATMS)/Advanced Traveler Information Systems (ATIS) (freeway surveillance) system in the Southeast Michigan - Metropolitan Detroit Area. The existing system was installed in 1980-81 and is a direct descendant of the John Lodge Freeway Surveillance project of the late 1960's. The State's existing five-year action plan calls for extending ATMS/ATIS coverage over a system encompassing some 250 miles. Staging, costs and all technical aspects of this plan were reexamined and refined in the context of evolving ITS technologies. The study reviewed traffic data, determined the area's functional requirements for ATMS/ATIS services, identified and analyzed alternative ATMS/ATIS technologies, and presented a staged plan of recommended actions. The study also developed a model approach to the development and deployment of alternative routings and traffic management plans for handling incidents.

## **Project Location :**

Detroit, Michigan

## **Partner(s) :**

Michigan DOT, FHWA, Wayne County Road Commission, Road Commission for Oakland Co., Macomb Co Road Commission, MI State Police, SE Michigan Council of Governments.

## **Start Date:**

September 1992

## **End Date:**

October 1994

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Morrie Hoewel	FHWA Michigan Division	(517)377-1880	Ext. 32
Dr. Kunwar Rajendra	Michigan DOT	(517)373-2247	



## EL PASO, TEXAS EARLY DEPLOYMENT PLANNING STUDY

### **Description:**

The study developed a plan to integrate real-time ITS technology with sound traffic management principles and focused on the movement of large commercial vehicles in the El Paso area and across the Mexican border. For example, truck locations, destination, type of load (if hazardous), and weight could be automatically tracked from an existing Transportation Management Center in City Hall. Current planning activities and implementation strategies of multiple agencies were integrated to facilitate the movement of trucks as a continuing activity. Prioritization of future improvements will be closely coordinated through a multi-jurisdictional Traffic Management Center.

### **Project Location :**

El Paso, Texas

### **Partner(s) :**

Texas DOT, City of El Paso

### **Start Date:**

April 1995

### **End Date:**

December 1998

### **Estimated Total ITS Funds:**

\$336,000

### **Estimated Total Project Cost:**

\$420,000

### **Contacts:**

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Carlos Chavez	Texas DOT - El Paso District	(915) 774-4307
Ted Marquez	City of El Paso	(915) 541-4035
Gene Schroeder	Texas DOT - TRF (Austin)	(512) 416-3309



# EVALUATION OF TELECOMMUNICATIONS COST OF OWNERSHIP VERSUS COST OF LEASING TRADEOFF

## **Description:**

The State of Maryland has conducted a detailed study to define its telecommunications requirements for the deployment of ITS throughout the State. This project provided a number of design options for their telecommunications, and conducted a detailed life cycle cost analysis of these options to determine if it should lease or own this infrastructure. In addition, Maryland has examined the relative value of various video quality levels to be used in their CCTV network surveying the roadways. They concluded that compressed video was acceptable to perform the required functions. This decision has a major impact on the cost of telecommunications. This project has been extended to produce both summary and detailed documentation on their results as well as the methodology, and to provide a video on the relative merits of compressed versus broadcast quality video. Finally, Maryland and their contractor have prepared a one day seminar on lessons learned in the telecommunications study, which are available on request from the ITS JPO:

(1) "A Case for Intelligent Transportation (ITS Telecommunications Analysis)," FHWA-JPO-97-0015

(2) "ITS Telecommunications: Public or Private? A Cost Tradeoff Methodology Guide," FHWA-JPO-97-0014

**Project Location :** Maryland

**Contractor(s) :** Computer Sciences Corporation

**Start Date:** October 1995

**End Date:** December 1997

**Estimated Total ITS Funds:** \$325,000

**Estimated Total Project Cost:** \$435,000

## **Contacts:**

William S. Jones	USDOT ITS JPO, HVH-1	(202) 366-2128
Alisoun Moore	Maryland State Highway Administration	(410) 685-1040



## FORT WORTH, TEXAS EARLY DEPLOYMENT PLANNING STUDY

### **Description:**

An ITS plan was developed that integrates the existing and projected features of traffic management activities underway in Fort Worth with the expanded scope and services provided by ITS technologies. This plan also provided a comprehensive linkage to the ITS plan concurrently under development in Dallas to provide a regionally integrated system.

### **Project Location :**

Fort Worth, Texas

### **Partner(s) :**

Texas DOT

### **Start Date:**

April 1995

### **End Date:**

July 1998

### **Estimated Total ITS Funds:**

\$400,000

### **Estimated Total Project Cost:**

\$500,000

### **Contacts:**

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Wallace Ewell	Texas DOT-Fort Worth District	(817) 370-6619
Walt Daniel	Texas DOT - TRF (Austin)	(512) 416-3158
Poonam Wiles	TTI - Arlington	(817) 261-1661



# FRESNO, CALIFORNIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study resulted in a Strategic ITS Deployment Plan for the Fresno metropolitan area and Fresno County. The full range of ITS user services were considered in the development of this plan. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs were considered along with funding and procurement issues in order to identify and screen alternative technologies. The Council of Fresno County Governments in partnership with Caltrans District 06 conducted this ITS effort with the concept of statewide coordination as a guiding principle, and developed a strategic plan for deployment of ITS technologies throughout Fresno County as well as coordinating it with other Central Valley ITS deployment efforts.

**Project Location :**

Fresno County, California

**Partner(s) :**

California DOT and Council of Fresno County Governments

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**Start Date:**

September 1996

**End Date:**

October 1998

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**Estimated Total  
ITS Funds:**

\$320,000

**Estimated Total  
Project Cost:**

\$400,000

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**Contacts:**

Frank Cechini	FHWA, California Division, HTA-CA	(916) 498-5005
Tony Boren	Council of Fresno County Governments	(209) 233-4148

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# GARDEN STATE PARKWAY, NEW JERSEY EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study developed a coordinated strategic plan for deploying an integrated ITS along the Garden State Parkway corridor in New Jersey. The corridor includes all of the facilities operated by the New Jersey Highway Authority, as well as the neighboring facilities and agencies with identified transportation needs, or which can be used as alternate routes. The plan is also consistent with the recently developed State of New Jersey "Integrated Transportation Management Strategies Master Plan."

**Project Location :** New Jersey

**Partner(s) :** New Jersey DOT

**Start Date:** July 1996

**End Date:** February 1998

**Estimated Total  
ITS Funds:** \$320,000

**Estimated Total  
Project Cost:** \$440,000

**Contacts:**

Breck Jeffers	FHWA New Jersey Division, HTC-NJ	(609) 637-4231
Roy Little	New Jersey Highway Authority	(908) 442-8600





# GRAND RAPIDS, MICHIGAN AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Michigan Department of Transportation prepared a Strategic ITS Deployment Plan focusing on integrated freeway and major arterial system management. It also contained an Incident Management Program. The deployment plan identified "user service" requirements and objectives for the area, the "functions" necessary to support each service, and defined a system architecture. Identified user services to be included are areawide traffic management and traveller information systems, a system that facilitated the movement of public transit and emergency vehicles, and a data collection database. Various technologies reviewed for deployment included signal control equipment, a communications network, sensors, detectors, CCTV, HAR transmitters, changeable message signs, ramp metering, and the possible future accommodation of HOV operations. The Incident Management Plan is applied to the US-131 freeway through Grand Rapids.

## **Project Location :**

Grand Rapids, Michigan

## **Partner(s) :**

Michigan DOT, FHWA, Grand Rapids & Environs Transportation Study, Grand Rapids Area Transit Authority, MI State Police, Kent Co Road Commission, Ottaqwa Co Road Commission, City of Grand Rapids

## **Start Date:**

July 1994

## **End Date:**

August 1996

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Morrie Hoevel	FHWA Michigan Division	(517) 377-1880	Ext. 32
Kunwar Rajendra	Michigan DOT	(517) 373-2247	



# GREENSBORO, NORTH CAROLINA CORRIDOR EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The purpose of the Early Deployment Study was to identify transportation problems and existing transportation systems and development strategies in the local area, and to develop a vision for future deployment.

**Project Location :**

Greensboro, North Carolina

**Partner(s) :**

North Carolina DOT

**Start Date:**

June 1992

**End Date:**

August 1994

**Estimated Total  
ITS Funds:**

\$150,000

**Estimated Total  
Project Cost:**

\$187,500

**Contacts:**

Max Tate	FHWA North Carolina Division, HDA-NC	(919) 856-4354
M. Pat Strong	North Carolina DOT	(919) 715-2464



# GREENVILLE, SOUTH CAROLINA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This congestion management plan consisted of two phases. Phase I included:

- \* Inventory and Data Collection
- \* Alternate Routes and Strategies
- \* Conceptual Advanced Traffic Management Systems (ATMS) Development
- \* Evaluation of Driver Information Systems
- \* ATMS Organization Development
- \* Legislation and Regulation Review
- \* Preliminary Study Report Preparation

Phase II included the preparation of conceptual designs as a result of the steering committee recommendations and the preparation of the final study report.

## **Project Location :**

Greenville-Spartanburg, South Carolina

## **Partner(s) :**

South Carolina DOT

## **Start Date:**

September 1992

## **End Date:**

March 1996

## **Estimated Total ITS Funds:**

\$200,000

## **Estimated Total Project Cost:**

\$250,000

## **Contacts:**

Steve Ikerd	FHWA South Carolina Division, HDA-SC	(803) 253-3890
Pat Harrison	South Carolina DOT	(803) 737-1456



# HAMPTON ROADS, VIRGINIA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

Virginia Department of Transportation (VDOT) and those cities and counties which make up the Hampton Roads/Tidewater area conducted a study to investigate the potential for bringing advanced technologies to the transportation system along the Virginia eastern shore. The outcome was an area-wide plan for utilizing existing and advanced technologies that integrates transportation management systems (traffic, transit, etc.) of the State and individual cities. This study included an evaluation of FHWA's ITS Planning and Project Deployment Process.

## **Project Location :**

Hampton Roads, Virginia

## **Partner(s) :**

Virginia DOT

## **Start Date:**

September 1992

## **End Date:**

October 1995

## **Estimated Total ITS Funds:**

\$497,000

## **Estimated Total Project Cost:**

\$597,000

## **Contacts:**

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
Stephany Hanshaw	Virginia DOT	(804) 924-2567



# HARTFORD, CONNECTICUT AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This study produced a Strategic ITS Deployment Plan for the Hartford metropolitan area. The full range of ITS user services were considered in the development of this plan. The Hartford MPO is a key player, along with the Connecticut DOT, in the study, and ensured public involvement in the process. This study was closely coordinated with future studies in New Haven, CT, and Springfield, MA, providing for a comprehensive plan for the I-91 corridor through southern New England. The overall goal is to prepare a strategic ITS deployment plan for the Hartford metropolitan area including a strategy for integrating the Hartford area system with other areas of the state. The plan covered a full range of ITS functions over a 20-year horizon. High priority needs include the integration of existing state freeway and arterial traffic management systems, implementing a regional incident management system, serving the information needs of select ISTEA-mandated management systems, and provision for coordination with ITS systems in other areas of the state. The Plan was developed using the FHWA ITS planning process outline (user services-based approach). The Plan includes eight tasks divided into two planning phases: development of an ITS User Services Plan and development of the ITS Strategic Deployment Plan.

**Project Location :** Hartford, Connecticut

**Partner(s) :** Connecticut DOT and Capital Region Council of Governments (CRCOG)

**Start Date:** June 1994

**End Date:** April 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Bob Ramirez	FHWA Connecticut Division	(860) 659-3703	Ext. 3004
Hal Decker	Connecticut DOT	(860) 594-2636	



# HONOLULU, HAWAII EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study developed a Strategic ITS Deployment Plan for the Honolulu metropolitan area. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs were considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :**

Honolulu, Hawaii

**Partner(s) :**

Hawaii DOT, City/County of Honolulu Department of Transportation Services, Oahu Metropolitan Planning Organization

**Start Date:**

July 1994

**End Date:**

April 1997

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$507,000

**Contacts:**

Glen Yasui	FHWA Hawaii Division, HEC-HI	(808) 541-2700
Richard Masuda	City/County of Honolulu DOT Services	(808) 527-6912



# I-5 SEATTLE TO VANCOUVER, BC AND I-90 SEATTLE TO SPOKANE, WASHINGTON EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The study resulted in a strategic ITS plan for the I-5 and I-90 corridors. The study sought stakeholder input to identify user needs and develop a list of User Services appropriate for the corridor. Specific ITS projects were identified, compared and selected for the corridor. Prospectus-type information was developed for the selected projects which includes project costs and anticipated benefits.

## **Project Location :**

Seattle and Spokane, Washington; Vancouver, British Columbia

## **Partner(s) :**

Washington State DOT

## **Start Date:**

March 1995

## **End Date:**

September 1997

## **Estimated Total ITS Funds:**

\$240,000

## **Estimated Total Project Cost:**

\$300,000

## **Contacts:**

Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Eldon Jacobson	Washington State DOT	(206) 685-3187



# I-10 NEW ORLEANS, LOUISIANA TO SAN ANTONIO, TEXAS EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The project developed a strategic plan for ITS deployment along the I-10 corridor from New Orleans, LA to San Antonio, TX. Particular emphasis was given to intermodal freight movement at strategic ports, efficiency of freight movement through the corridor, and rural ITS safety applications.

**Project Location :**

I-10 Corridor between New Orleans, Louisiana and San Antonio, Texas

**Partner(s) :**

Texas DOT & Louisiana DOTD

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**Start Date:**

February 1997

**End Date:**

August 1998

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**Estimated Total  
ITS Funds:**

\$300,000

**Estimated Total  
Project Cost:**

\$355,000

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**Contacts:**

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Eric Kalivoda	Louisiana DOTD	(504) 358-9124

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# I-40 NORTHERN ARIZONA EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This study resulted in the development of an ITS Strategic plan for I-40 which is a rural interstate corridor. Input in the plan was sought from the various stakeholders in order to determine the user needs. Existing ITS components were incorporated into the study. Since this was the first ITS Strategic Plan for a rural corridor, it can serve as a benchmark for further deployment of ITS technologies on rural corridors.

**Project Location :** Northern Arizona

**Partner(s) :** Arizona DOT

**Start Date:** March 1995

**End Date:** June 1997

**Estimated Total  
ITS Funds:** \$130,000

**Estimated Total  
Project Cost:** \$162,500

## **Contacts:**

Alan Hansen	FHWA Arizona Division, HPR1-AZ	(602) 379-3923
Tim Wolfe	Arizona State DOT	(602) 255-6622



# I-70 DENVER, COLORADO CORRIDOR EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This Colorado DOT study focused on the application of ITS technology in the I-70 corridor west of Denver. The corridor has a high potential for developing the rural application of ITS technologies with heavy emphasis on Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS). This study focused on developing a comprehensive implementation program of ITS technologies aimed at a multi-phase effort which identified the most feasible options, gains public support, and then enlists cooperation of private sector interests. The project has three phases. This effort included phase one only, in which a consultant identified and evaluated applicable ITS technologies, identified early action items, prepared a corridor master plan, assisted in educational efforts, and prepared reports on the project.

**Project Location :** Denver, Colorado

**Partner(s) :** Colorado DOT

**Start Date:** July 1992

**End Date:** July 1996

**Estimated Total  
ITS Funds:** \$168,000

**Estimated Total  
Project Cost:** \$210,000

## **Contacts:**

Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969-6730	Ext. 362
John Kiljan	Colorado DOT	(303) 757-9508	



# I-71 CORRIDOR BETWEEN COLUMBUS AND CLEVELAND EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This feasibility study investigated the application of ITS technologies to a rural corridor. It also linked the urban regional traffic management systems for the Columbus and Cleveland metropolitan areas.

**Project Location :**

I-71 between Columbus and Cleveland, Ohio

**Partner(s) :**

Ohio DOT

**Start Date:**

June 1996

**End Date:**

August 1998

**Estimated Total  
ITS Funds:**

\$200,000

**Estimated Total  
Project Cost:**

\$250,000

**Contacts:**

James Buckson

FHWA Ohio Division, HDA-OH

(614) 280-6846

George Saylor

Ohio DOT

(614) 752-8099



## I-79 ERIE TO WASHINGTON, PENNSYLVANIA EARLY DEPLOYMENT PLANNING STUDY

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### **Description:**

This project was conducted by the Pennsylvania Department of Transportation which provided an ITS user service plan and an ITS deployment plan for the safe and efficient movement of people and goods along the I - 79 corridor from Erie to Washington, Pennsylvania. The I - 79 corridor considered in this project will cut across seven counties and four Pennsylvania DOT Engineering Districts in both rural and urban areas.

### **Project Location :**

Pittsburgh, Pennsylvania

### **Partner(s) :**

Pennsylvania DOT

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### **Start Date:**

June 1995

### **End Date:**

June 1997

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### **Estimated Total ITS Funds:**

\$300,000

### **Estimated Total Project Cost:**

\$375,000

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### **Contacts:**

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517
Steve Koser	Pennsylvania DOT	(717) 705-1443

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## I-84 PORTLAND, OREGON TO BOISE, IDAHO EARLY DEPLOYMENT PLANNING STUDY

### **Description:**

This study resulted in a strategic ITS deployment plan for the I-84 and SR-14 corridor between Portland, OR - Vancouver, WA and Boise, ID. The study sought stakeholder input to identify user needs and developed a list of User Services appropriate for the corridor. Specific ITS projects were identified, compared and selected for the corridor. Prospectus-type information was developed for selected projects which included project costs and anticipated benefits.

### **Project Location :**

Portland, Oregon and Boise, Idaho

### **Partner(s) :**

Washington State DOT

### **Start Date:**

March 1995

### **End Date:**

September 1997

### **Estimated Total ITS Funds:**

\$320,000

### **Estimated Total Project Cost:**

\$400,000

### **Contacts:**

Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Eldon Jacobson	Washington State DOT	(206) 685-3187



## I-94 MILWAUKEE TO MINNEAPOLIS AND I-90 BELOIT TO LACROSSE EARLY DEPLOYMENT PLANNING STUDY

### **Description:**

The purpose of this ITS Early Deployment Planning Study was to develop a strategic plan to develop ITS Intercity Corridor initiatives which will improve mobility, efficiency and safety of travel on the I-94 corridor, Milwaukee to Minneapolis, and the I-90 corridor, Beloit to Lacrosse. The study proposal included the evaluation of the need for and the identification of ITS solutions appropriate for the corridors. This study focused on commercial vehicle operations, incident management and personal travel safety, and provision of route guidance and real-time travel condition information. ITS technology and systems applications existing or programmed for future implementation as part of the Gary-Chicago-Milwaukee ITS Priority Corridor were also considered as part of the study.

### **Project Location :**

Milwaukee and LaCrosse, Wisconsin; Minneapolis, Minnesota

### **Partner(s) :**

Wisconsin DOT

### **Start Date:**

March 1995

### **End Date:**

May 1997

### **Estimated Total ITS Funds:**

\$240,000

### **Estimated Total Project Cost:**

\$349,988

### **Contacts:**

Mark Hoines	FHWA Wisconsin Division, HDA-WI	(608) 829-7515
Phil DeCabooter	Wisconsin DOT	(608) 267-0452



# INDIANAPOLIS, INDIANA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

**Description:** The purpose of this project was to determine which ITS User Services will be the most cost effective and beneficial for the Indianapolis area, culminating in the development of a multi-year strategic ITS deployment plan. The Indiana DOT has formed a "deployment committee" to implement the first of the plan's recommended improvements.

**Project Location :** Indianapolis, Indiana

**Partner(s) :** Indiana DOT

**Start Date:** June 1994

**End Date:** July 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## Contacts:

Wendall Meyer	FHWA Indiana Division, HSP-IN	(317) 226-5234
William Flora	Indiana DOT	(317) 233-3944



## ITS/CVO MAINSTREAMING PROJECTS

### **Description:**

Since 1992, every State except Hawaii has participated in an ITS/CVO institutional issues study. These individual and multi-State studies provided forums for State regulatory agencies and representatives from the motor carrier industry to identify opportunities to streamline compliance functions with ITS/CVO technology applications. Now that the barriers to ITS/CVO deployment have been identified, the States are moving towards the next stage - ITS/CVO Mainstreaming.

Mainstreaming means moving ITS/CVO services beyond concept development and testing into operation. The basic building block for the ITS/CVO program is the State; however, State CVO programs must be developed in the context of regional CVO programs that serve the nation's major trucksheds. Most truck trips are under 200 miles from home base and are concentrated within major population and economic regions, which can be defined as 7 regional platforms (SE, SW, MW, NE, NW, W, and Great Lakes). The CVO program must establish and maintain regional CVO forums aligned with these trucksheds to ensure that CVO services are delivered where the trucks are and that services within trucksheds are relatively uniform from the carrier's perspective.

This program has many functions: 1) the support of State officials (including DOT, DMV, State Patrol, DOR officials, etc.) and motor carriers (especially smaller motor carrier firms) participation in regional ITS/CVO forums, 2) the analysis of benefits and costs of ITS/CVO technologies to individual State agencies as well as motor carriers, 3) the development of ITS/CVO business plans for regional platforms as well as individual States, and 4) the facilitation of State-and region-wide long term deployment of proven ITS/CVO technologies. Funds also will support full-time, regional champions who will coordinate and convey the purposes, technologies, costs, and benefits of ITS/CVO activities at the states to legislatures, business, and the public.

Currently, there are seven CVO Mainstreaming projects comprised of 33 States. Several states are seeing the benefits of joining multiple regional mainstreaming consortia to ensure that their individual state mainstreaming activities are synchronized with neighboring states. The Regional Consortia (with lead states identified) are as follows:

I-95 Coalition/Northern: NJ\* (Lead) MA, CT, RI, ME  
 I-95 Coalition/Eastern: NJ\* (Lead), WV\*, VA\*, MD, DE, NY, PA  
 Advantage CVO/Southeastern: KY\* (Lead), NC, TN, GA, LA, VA\*  
 Advantage CVO/Great Lakes: KY\* (Lead), OH, IN, MI, MN, WI, WV\*  
 Mississippi Valley: MO--Lead, KS, NE, SD  
 Northwestern: WA--Lead, ID, MT, WY, UT\*  
 Western: OR--Lead, CA, UT\*, CO

\* Designates states participating in more than one regional consortium.

### **Project Location :**

As reflected in the description of the Regional Consortia.

### **Contractor(s) :**

Various

### **Start Date:**

January 1992

### **End Date:**

May 1998





**Estimated Total  
ITS Funds:** \$7,230,000

**Estimated Total  
Project Cost:** \$13,220,000

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**Contacts:**

Jeff Loftus

FHWA - OMC, HSA-20

(202) 366-4516

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## ITS/CVO TRAINING

### **Description:**

The primary objective of this effort was to plan, develop, implement and update ITS/CVO training courses. These courses provided ITS/CVO state, federal and private managers and implementers with the skills and knowledge necessary to accomplish the ITS/CVO Mission and Goals. ITS/CVO training curriculum consisted of two broad areas: project management skills development and technical skills development. Upon completion of these courses, participants were able to:

- Understand and articulate the ITS/CVO Program's Vision, Mission and Program Goals and Objectives;
- Understand the standards and procedures for ITS/CVO program funding, development, testing and deployment along with operations and technology maintenance requirements;
- Understand the institutional issues or barriers to program success, and promote the importance of the non-technical agreements which are critical for a state to develop, thus ensuring successful long-term technology deployment;
- Understand the technical issues in the areas of communication technologies, system integration, and technology standards, as well as the strategies necessary to deploy these technologies;
- Understand the requirements for implementation of strategies designed to ensure cooperation among state partners, and serve as a catalyst for further efforts toward deployment of ITS/CVO technologies.

A basic management course is the first in a series of courses which will help create uniformity and standardization in reaching common goals and objectives among ITS/CVO partners and stakeholders. This course was available in the spring of 1997. Technical courses will provide federal and state personnel with the skills necessary to effectively deploy, operate and evaluate ITS/CVO technologies that enhance public safety and are cost-effective, user friendly, and interoperable with existing public and private information systems. Technical courses were available in the fall of 1997. Both management and technical courses will be updated regularly.

**Project Location :** Washington, D.C.

**Contractor(s) :** MELE & Associates, JHU/Applied Physics Laboratory, Booz-Allen & Hamilton

**Start Date:** October 1995

**End Date:** September 1998

**Estimated Total  
ITS Funds:** \$2,000,000

**Estimated Total  
Project Cost:** \$2,000,000



**Contacts:**

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Gladys Cole	FHWA-OMC National Training Center, HPS-20	(703) 235-0501
Zeborah English	FHWA-OMC ITS/CVO, HSA-20	(202) 366-0398

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# ITS STRATEGIC PLAN FOR MARICOPA COUNTY - PHOENIX AREA

## **Description:**

This study resulted in the development of a Strategic ITS Deployment Plan for the Phoenix Metropolitan Area. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs will be considered along with funding and procurement issues in order to identify and screen alternative technologies. The administration of the project was carried out by the Maricopa County DOT. Coordination of the study was a cooperative effort between the County and the MPO and took advantage of steering teams previously formed to study the regional coordination of the traffic signal systems.

**Project Location :** Phoenix, Arizona

**Partner(s) :** Arizona DOT and Maricopa County DOT

**Start Date:** May 1994

**End Date:** January 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Alan Hansen	FHWA Arizona Division, HPR1-AZ	(602) 379-3646
Donald Wiltshire	Maricopa County DOT	(602) 506-8659



# JACKSONVILLE, FLORIDA EARLY DEPLOYMENT PLANNING STUDY

**Description:** This project resulted in a definitive, comprehensive study that will chart the correct course for the Jacksonville Urban area to attain an efficiently managed transportation system. Areas of concentration included: Travel and Traffic Management, Public Transportation Management, and Emergency Management.

**Project Location :** Jacksonville, Florida

**Partner(s) :** Florida DOT

**Start Date:** April 1995

**End Date:** February 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## Contacts:

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693
Marc Bounds	Florida DOT	(904) 381-8807



# KANSAS CITY, MISSOURI-KANSAS AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The goal of this study was to develop a master plan for implementing ITS user services for transportation management. The plan is based on user services that can successfully address the needs of the bi-state Kansas City transportation system. The consultant evaluated congestion in the area and recommended strategies which include, but are not limited to, the Incident Management and Traffic Control user services.

## **Project Location :**

Kansas City, Missouri-Kansas

## **Partner(s) :**

Kansas DOT (lead agency), Missouri DOT, and Kansas City MPO

## **Start Date:**

September 1993

## **End Date:**

March 1996

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Bob Alva	FHWA Kansas Division, HPG-KS	(785) 267-7281
Virgil Stiffler	FHWA Missouri Division, HDP-MO	(314) 636-7104
Edward Halter	Kansas DOT	(785) 677-5963
Dale Ricks	Missouri DOT	(816) 889-6301



# KERN COUNTY, CALIFORNIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:** This study resulted in the development of a strategic ITS deployment plan for the Kern County metropolitan area. The study developed a User Service Plan and functional requirements developed from User Service Needs. These needs were considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :** Kern County, California

**Partner(s) :** California DOT, Kern County Council of Governments

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**Start Date:** September 1995

**End Date:** July 1997

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**Estimated Total  
ITS Funds:** \$350,000

**Estimated Total  
Project Cost:** \$500,000

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## Contacts:

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Ronald Brummett	Kern Co. Council of Governments	(805) 861-2191

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# KNOXVILLE, TENNESSEE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Knoxville Urban Area Metropolitan Planning Organization, in cooperation with the City of Knoxville, the Tennessee Department of Transportation, and the University of Tennessee, conducted an early deployment planning study that allowed for a comprehensive ITS assessment and develop a strategic ITS deployment plan for the Knoxville area.

The transportation system in Knoxville will be going through major reconstruction in the upcoming years. The study will specifically be focused on improving the system efficiency and safety through "SMART" technology under construction conditions.

## **Project Location :**

Knoxville, Tennessee

## **Partner(s) :**

Knoxville Urban Area Metropolitan Planning Organization and Tennessee DOT

## **Start Date:**

September 1996

## **End Date:**

September 1998

## **Estimated Total ITS Funds:**

\$200,000

## **Estimated Total Project Cost:**

\$250,000

## **Contacts:**

Nathaniel Price	FHWA Tennessee Division, HPR-TN	(615) 781-5775
Jeff Welch	Knoxville Urban Area MPO	(423) 215-2500





# LAS VEGAS, NEVADA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

**Description:**

This study resulted in the development of a strategic ITS Deployment Plan for the Las Vegas metropolitan area. The study sought stakeholder input, including the public, in order to develop a Users' Service Plan. Functional requirements were developed from the User Services Needs. These needs were considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :** Las Vegas, Nevada

**Partner(s) :** Nevada DOT

**Start Date:** September 1993

**End Date:** December 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

**Contacts:**

Greg Novak	FHWA Nevada Division, HPR-NV	(702) 697-1203
Keith Maki	Nevada DOT	(703) 888-7446



# LEXINGTON, KENTUCKY EARLY DEPLOYMENT PLANNING STUDY

**Description:** This project provided a framework in which the local transportation community can develop and document a strategic deployment plan, allowing planners to continue to apply state-of-the-art solutions to the area's transportation problems.

**Project Location :** Lexington, Kentucky

**Partner(s) :** Kentucky Transportation Cabinet, and City of Lexington

**Start Date:** March 1995

**End Date:** February 1997

**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$250,000

## Contacts:

Al Alonzi	FHWA Kentucky Division, HDA-KY	(502) 223-6729
Brent Sweger	FHWA Kentucky Division, HDA-KY	(502) 223-6743



# LOS ANGELES/SAN DIEGO, CALIFORNIA CORRIDOR EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study examined the current and proposed uses of ITS technology in the San Diego - Los Angeles ITS priority corridor. The study was multi modal in nature and included all major facilities and all categories of ITS technology. The primary product of this study was a master plan to coordinate the deployment of ITS technology in the corridor and in the major metropolitan areas along the corridor (San Diego, Orange County, San Bernadino/ Riverside, Los Angeles).

**Project Location :** Southern California

**Partner(s) :** California DOT

**Start Date:** September 1992

**End Date:** June 1998

**Estimated Total  
ITS Funds:** \$150,000

**Estimated Total  
Project Cost:** \$150,000

**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
George Smith	CalTrans	(916) 654-9849



# LOUISVILLE, KENTUCKY AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This planning study developed a regional Advanced Traffic Management Systems (ATMS) plan for metropolitan Louisville, Kentucky. A consultant performed the necessary studies for development of the early implementation plan. The tasks included:

1. Inventory the existing system and collect data including traffic volumes, speeds, and delays.
2. Develop management strategies and alternative routing plans for incidents. Elements considered include detection, communication systems, closed circuit TV, changeable message signs, highway advisory radio, and a centralized traffic control center. The end product was the Traffic Management Plan, the recommended system modifications required to implement the plan, and the estimated cost of implementing each recommended element.
3. Develop and optimize traffic signal timing plans on selected arterials in Louisville.

## **Project Location :**

Louisville, Kentucky

## **Partner(s) :**

Kentucky Transportation Cabinet

## **Start Date:**

June 1992

## **End Date:**

August 1994

## **Estimated Total ITS Funds:**

\$468,616

## **Estimated Total Project Cost:**

\$585,770

## **Contacts:**

Al Alonzi	FHWA Kentucky Division, HDA-KY	(502) 223-6729
Brent Sweger	FHWA Kentucky Division, HDA-KY	(502) 223-6743
Bob Flener	Kentucky Transportation Cabinet - District 5	(502) 367-6411



# LOWER HUDSON VALLEY/WHITE PLAINS, NEW YORK EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The area's coordinated Intelligent Transportation System (ITS) effort developed a strategic plan for area-wide deployment. The study followed the FHWA's User Services planning and deployment process. Key elements of the study included:

- \* Establishment of a coalition of key stakeholders;
- \* Development of an area-wide Strategic Plan based on the area's unique user service needs;
- \* Identification of key early implementation projects;
- \* Development of a Phased Implementation Plan with timetable and funding availability;
- \* Identification/quantification of operations and maintenance resource needs;
- \* Identification of needed institutional arrangements;
- \* Establishment of public outreach programs.

In support of this ITS effort, the New York State Department of Transportation has programmed more than \$27 million in their five-year capital program for Intelligent Transportation Systems (ITS) activities for the Lower Hudson Valley area. A final report has been submitted through FHWA channels.

## **Project Location :**

Lower Hudson Valley/White Plains, New York

## **Partner(s) :**

New York State DOT

## **Start Date:**

July 1994

## **End Date:**

November 1998

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Ed Roberts	New York State DOT	(518) 457-1232	



# MEMPHIS, TENNESSEE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This project allowed for comprehensive ITS assessment, and the development of a strategic ITS deployment plan for the Memphis area. Areas of concentration included traffic management and surveillance; transit, paratransit and ridesharing; and commercial fleets and urban commodities movement.

**Project Location :** Memphis, Tennessee

**Partner(s) :** Tennessee DOT and Memphis MPO

**Start Date:** June 1995

**End Date:** July 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

**Contacts:**

Lori Cove	FHWA Tennessee Division, HPR-TN	(615) 736-7106
Alan Gray	Memphis MPO	(901) 576-7433



# NASHVILLE, TENNESSEE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Nashville Area MPO implemented a program of ITS user services which emphasizes traveler and tourist information and traffic management. This program was built upon the traffic and transit management and infrastructure improvements already underway in the 5-county area. Services were concentrated in locations which are the primary destinations of tourists and business travelers, including the Nashville CBD, Opryland, Music Row, Nashville International Airport, and the Vanderbilt University area.

Traveler information services will include traveler advisories, traveler information services (including non-traffic information), trip planning, location displays, and route selection. These services will be offered at visitor information centers, intermodal centers such as the landport, convention hotels, the regional airport, and along major travel corridors.

The traveler information services would be tied in with a Traffic Management Center (TMC) which would offer a coordinated program of accident detection and management, traffic network monitoring, traffic control, and construction management.

**Project Location :** Nashville, Tennessee

**Partner(s) :** Tennessee DOT and Nashville MPO

**Start Date:** December 1994

**End Date:** July 1997

**Estimated Total  
ITS Funds:** \$220,000

**Estimated Total  
Project Cost:** \$275,000

## **Contacts:**

Leigh Ann Tribble	FHWA Tennessee Division, HPR-TN	(615) 736-7107
Preston Elliott	Nashville MPO	(615) 862-7204
Paige Watson	Nashville MPO	(615) 862-7215



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## NATIONAL CAPITAL METRO AREA (UMBRELLA) EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study provided guidance on regionwide ITS applications and priorities to the agencies responsible for developing and implementing transportation management systems in Maryland, Virginia, and the District of Columbia. The primary objectives were (1) to identify effective mechanisms for interjurisdictional cooperation to make sure ITS activities are compatible and coordinated, (2) to identify methods to establish a basis for area decision makers and political leaders to endorse ITS on a regionwide basis, and (3) to identify options for a high level regional system architecture for the National Capital Metropolitan Area.

**Project Location :** National Capital Metro Area

**Partner(s) :** Virginia DOT

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**Start Date:** March 1995

**End Date:** April 1997

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**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$250,000

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**Contacts:**

Jim Robinson

Virginia DOT - Richmond

(804) 786-6677

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# NEW CASTLE COUNTY, DELAWARE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Delaware Department of Transportation developed a strategic plan that will provide a clear path toward the successful deployment of an integrated ITS/transportation management plan for the State. The plan considered the various modes and activities of other jurisdictions and stakeholders in the interest of developing a comprehensive program of regional compatibility and coordination.

## **Project Location :**

New Castle County, Delaware

## **Partner(s) :**

Delaware DOT

## **Start Date:**

March 1995

## **End Date:**

August 1998

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Asiyah Grant	FHWA Delaware Division, HDA-DE	(302) 734-1719
Gene Donaldson	Delaware DOT	(302) 739-7786



# NEW ORLEANS, LOUISIANA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Louisiana Department of Transportation and Development (LDTOD) and the New Orleans Regional Planning Commission (RPC) developed an Intelligent Transportation System Strategic Plan for the New Orleans metropolitan area. The plan considered both short- and long-range objectives for the implementation and deployment of ITS technologies throughout the metropolitan area.

**Project Location :**

New Orleans, Louisiana

**Partner(s) :**

Louisiana DOT

**Start Date:**

September 1993

**End Date:**

March 1997

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

**Contacts:**

Seve Serna	FHWA Louisiana Division, HDA-LA	(504) 389-0251
Conrad Rein	New Orleans Regional Planning Commission	(504) 568-6625



## NORTHERN VIRGINIA/WASHINGTON, D.C. AREA EARLY DEPLOYMENT PLANNING STUDY

### **Description:**

The primary objective of this study was to develop a long-range, comprehensive plan of an Advanced Traffic Management Systems (ATMS) in the Northern Virginia region of the Washington, D.C. metropolitan area. The study analyzed and assessed current and planned extensions of traffic management capabilities in the region; defined an expandable and adaptable systems architecture; identified supporting advanced technologies, and developed an implementation plan to guide ATMS deployment. This study was coordinated with other Early Deployment initiatives in the Washington, D.C. area.

**Project Location :** Northern Virginia/Washington, DC

**Partner(s) :** Virginia DOT

**Start Date:** September 1993

**End Date:** May 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

### **Contacts:**

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
James R. Robinson	Virginia DOT	(804) 786-6677



# OKLAHOMA CITY, OKLAHOMA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Oklahoma City Areawide Early Deployment Planning Study established criteria to measure the performance of a proposed traffic operations system, including reductions in travel times, fuel consumption, accidents and intersection delay. A more qualitative measurement involved a survey of drivers who use these area's arterial and freeway corridors to determine their perception of improved traffic flow. The study examined needed functional areas for a traffic control center, including traffic network monitoring, adaptive traffic control, traveler advisory, communications, incident detection and management, parking management and demand management. The study determined where and when these services are needed.

**Project Location :** Oklahoma City, Oklahoma

**Partner(s) :** Association of Central Oklahoma Governments (ACOG)

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**Start Date:** October 1996

**End Date:** October 1998

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**Estimated Total  
ITS Funds:** \$250,000

**Estimated Total  
Project Cost:** \$312,000

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**Contacts:**

Deanna Mills	FHWA Oklahoma Division	(405) 945-6172
Alan Soltani	Oklahoma DOT	(405) 521-2861

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# OMAHA, NEBRASKA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The objective of this study was to develop a long-range, comprehensive plan for development and implementation of ITS user services in the Omaha-Council Bluffs metropolitan area. This study, conducted by the University of Nebraska at Lincoln (UNL), resulted in a plan which will provide a "road map" for incorporating ITS solutions into the area's long-range transportation plan and transportation improvement program.

## **Project Location :**

Omaha, Nebraska

## **Partner(s) :**

Nebraska Department of Roads, Iowa DOT, Omaha MPO

## **Start Date:**

September 1993

## **End Date:**

December 1997

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Milo Cress	FHWA Nebraska Division, HDA-NE	(402) 437-5221
Patrick McCoy	University of Nebraska, Lincoln	(402) 472-5019



# ORANGE COUNTY, CALIFORNIA EARLY DEPLOYMENT PLANNING PROJECT

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**Description:**

This project developed a Preliminary Design Report which identified the functional requirements, area of coverage, hardware and software requirements, costs, estimated benefits, and project phasing for Phase I of a county-wide Advanced Traveler Information System. Plans, specifications and estimates were developed for the field installation and the system hardware and software components.

**Project Location :**

Orange County, California

**Partner(s) :**

California DOT and Orange County Transportation Authority

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**Start Date:**

September 1993

**End Date:**

March 1996

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**Estimated Total  
ITS Funds:**

\$450,000

**Estimated Total  
Project Cost:**

\$562,500

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**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Dean Delgado	Orange County Transportation Authority	(714) 560-6282

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## ORLANDO, FLORIDA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This project developed an areawide ITS plan for the Orlando area to improve mobility, safety and productivity on the highway and transit networks. Congestion levels on significant routes in the area were determined, and short - medium, and long - term measures and ITS strategies were identified to alleviate congestion.

**Project Location :** Orlando, Florida

**Partner(s) :** Florida DOT

**Start Date:** April 1995

**End Date:** June 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

**Contacts:**

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693
Jon Cheney	Florida Department of Transportation	(904)-943-5322



# PENNSYLVANIA TURNPIKE CORRIDOR EARLY DEPLOYMENT PLANNING STUDY

**Description:** The Pennsylvania Turnpike Authority conducted an ITS Early Deployment corridor study consisting of a needs-based approach examining the possible applications of advanced technologies to existing and future traffic and incident management programs. A Strategic Plan was developed for ITS deployment on the Pennsylvania Turnpike in the Greater Philadelphia to Greater Pittsburgh corridor.

**Project Location :** Pennsylvania

**Partner(s) :** Pennsylvania DOT and Pennsylvania Turnpike Commission

**Start Date:** November 1993

**End Date:** February 1996

**Estimated Total  
ITS Funds:** \$300,000

**Estimated Total  
Project Cost:** \$375,000

## Contacts:

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517	
Tim Scanlon	Pennsylvania Turnpike Commission	(717) 939-9551	Ext. 5590





# PITTSBURGH, PENNSYLVANIA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The Pennsylvania Department of Transportation (DOT) through this deployment planning study has developed strategic plans for the Pittsburgh area freeway management system. The system, which will mainly cover I-276/376, will tentatively include closed circuit television, parkway advisory radio, ramp metering, surveillance and control system, changeable message signs (CMS), and an operations center. This Freeway Management System will interface with other existing and planned systems (i.e., existing high occupancy vehicle HOV lanes, changeable message signs, a planned telephone advisory system, and the planned City of Pittsburgh computerized traffic signal system).

**Project Location :** Pittsburgh, Pennsylvania

**Partner(s) :** Pennsylvania DOT

**Start Date:** December 1992

**End Date:** March 1994

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517
Thomas Fox	Pennsylvania DOT	(412) 429-4975



## PORTLAND, MAINE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Greater Portland Council of Governments (GPCOG) conducted an early deployment study that developed a strategic deployment plan for ITS technologies which addresses the needs of the Portland metropolitan area.

**Project Location :**

Portland, Maine

**Partner(s) :**

Greater Portland Council of Governments

**Start Date:**

September 1996

**End Date:**

April 1998

**Estimated Total  
ITS Funds:**

\$56,000

**Estimated Total  
Project Cost:**

\$70,000

**Contacts:**

Steve Beningo	FHWA Maine Division, HPR-ME	(207) 622-8350	Ext. 22
Joe Kott	Greater Portland Council of Governments	(207) 774-9891	



# PORTLAND, OREGON AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The plan developed by this effort is a six year plan for implementation of an Advanced Traffic Management System (ATMS). The estimated total capital cost for the six year implementation is approximately \$25 million. Detection will include closed circuit television, dedicated cellular service and detectors primarily at ramp meter locations. The Traffic Operations Center (TOC) will utilize existing space owned by ODOT and be remodeled to accommodate TOC equipment and personnel.

**Project Location :** Portland, Oregon

**Partner(s) :** Oregon DOT

**Start Date:** July 1991

**End Date:** January 1995

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Torri Kinne	FHWA Oregon Division	(503)399-5749
Dennis Mitchell	Oregon DOT	(503)731-8218



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## PROCUREMENT FOR ITS

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**Description:** The objectives of this project were to (1) identify and analyze contracting issues which have arisen or are likely to arise in the development and deployment of ITS and which may be constraining or hampering the implementation of ITS technologies and (2) develop legally sound, innovative models for contracting for ITS technologies by State and local contracting agencies. The research effort included an examination of the requirements for competitive bidding, combined bidding, combined bidding/joint ventures, advertisement, content of proposals or bids, use of patented processes or technologies or exclusive sources, bid security deposits, submission of proposals, negotiations, awards of contracts, and intellectual property rights to technology developed or acquired under the procurement contract. A final report titled "Innovative Contracting Practices for ITS" has been produced.

**Project Location :** Cambridge, Massachusetts

**Contractor(s) :** L. S. Gallegos & Associates

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**Start Date:** October 1994

**End Date:** December 1996

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**Estimated Total  
ITS Funds:** \$312,684

**Estimated Total  
Project Cost:** \$312,684

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**Contacts:**

William Jones

USDOT ITS JPO, HVH-1

(202)366-2128

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# PROVIDENCE, RHODE ISLAND AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This project created a plan which will direct the implementation and operation of ITS in the State of Rhode Island based on the specific needs and resources of the State. The study used the ITS Planning and Project Deployment Process. Rhode Island is pursuing ITS and their Congestion Management System planning concurrently, and is developing and utilizing common baseline data, performance standards, and goals.

## **Project Location :**

Providence, Rhode Island

## **Partner(s) :**

Rhode Island DOT

## **Start Date:**

January 1994

## **End Date:**

May 1997

## **Estimated Total ITS Funds:**

\$400,000

## **Estimated Total Project Cost:**

\$500,000

## **Contacts:**

Gabe Brazao	FHWA Rhode Island Division, SHA-RI	(401) 528-4551	
Cynthia Levesque	Rhode Island DOT	(401) 277-1362	Ext. 4010



# RALEIGH/DURHAM/CHAPEL HILL, NORTH CAROLINA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This project was an areawide study of potential ITS deployment activities in the Raleigh/Durham/Chapel Hill area. A twelve-county study area has been identified; however, the primary focus of the report was the most urbanized counties including Durham, Orange, and Wake. Through a cooperative effort by the North Carolina Department of Transportation, the Metropolitan Planning Organizations (MPO), and local advisory committees, the study detailed both short-term, medium-term, and long-term traffic management needs for this area.

**Project Location :** Raleigh/Durham/Chapel Hill, North Carolina

**Partner(s) :** North Carolina DOT

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**Start Date:** July 1994

**End Date:** April 1997

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**Estimated Total  
ITS Funds:** \$250,000

**Estimated Total  
Project Cost:** \$312,500

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**Contacts:**

Max Tate	FHWA North Carolina Division, HDA-NC	(919) 856-4354
Blake Norwood	North Carolina DOT	(919) 733-4705



# RICHMOND, VIRGINIA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The purpose of this study was to identify opportunities for the application of ITS services in the Richmond metropolitan area and to develop a strategic deployment plan that provides for coordination among the involved jurisdictions and integration of ITS with existing systems. The Richmond metropolitan area includes the cities of Richmond, Petersburg, Colonial Heights and Hopewell and the counties of Henrico, Chesterfield, and Hanover in central Virginia.

**Project Location :** Richmond, Virginia

**Partner(s) :** Virginia DOT

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**Start Date:** July 1994

**End Date:** October 1996

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**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

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**Contacts:**

Tom Jennings	FHWA Virginia Division, HDA-VA	(804) 281-5107
Robb Alexander	Virginia DOT	(804) 524-6000



# ROCHESTER, NEW YORK AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This project provided direction for the design of an area-wide advanced traffic management system to be implemented within the next few years and integrated with the existing computerized county-wide signal system. The project consisted of three tasks. The objective of Task I was to conduct an area-wide corridor assessment to inventory and identify existing congestion problems. This task also evaluated freeway management techniques and detection technologies. Task II reviewed communication processes and incident response plans in order to develop a comprehensive incident management program. Task III focused on overcoming the technical and legal stumbling blocks that impede the working relationship between area jurisdictions. This was accomplished by identifying, prioritizing, and recommending solutions for inter-jurisdictional issues.

**Project Location :** Rochester, New York

**Partner(s) :** New York State DOT

**Start Date:** September 1992

**End Date:** May 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Jerry Zell	FHWA New York Division, HTS-NY	(518) 431-4125	Ext. 228
Ed Roberts	New York State DOT	(518) 457-1232	
Jim Willer	New York State DOT	(716) 272-3450	





# SACRAMENTO, CALIFORNIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study resulted in a Strategic ITS Deployment Plan for the Sacramento metropolitan area. The full range of ITS user services were considered in the development of this plan. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs will be considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :**

Sacramento, California

**Partner(s) :**

California DOT and Sacramento Area Council of Governments

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**Start Date:**

September 1993

**End Date:**

August 1996

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**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

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**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Michael Hoffacker	Sacramento Area Council of Governments	(916) 457-2264



# SALT LAKE CITY, UTAH AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This Early Deployment Planning project developed an Intelligent Transportation Systems Strategic Plan for the Salt Lake City Metropolitan Area. The plan will serve as a guide for the implementation and deployment of ITS technologies including ATMS, traveler information, roadway weather, carry on management and transit applications throughout the metro area. This plan identifies a direction for coordinated ITS deployment, and builds off of the ongoing contracts to develop an advanced traffic management system in the Salt Lake Valley area.

**Project Location :** Salt Lake City, Utah

**Partner(s) :** Utah DOT

**Start Date:** September 1993

**End Date:** March 1997

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Martin Knopp	FHWA Utah Division, HPM-UT(2)	(801) 963-0078	Ext. 236
Dave Kinnecom	Utah DOT	(801) 965-4910	



# SAN ANTONIO, TEXAS EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The purpose of this study was to develop a metropolitan system ITS architecture which integrates the Texas DOT, City of San Antonio, VIA (San Antonio's transit authority) and the MPO's current management systems into a single unified system. This will give each organization involved a standard which will allow sharing of data, control, and response. This project has been incorporated into the ITS Model Deployment project in San Antonio, Texas.

**Project Location :** San Antonio, Texas

**Partner(s) :** Texas DOT

**Start Date:** April 1995

**End Date:** September 1998

**Estimated Total  
ITS Funds:** \$397,000

**Estimated Total  
Project Cost:** \$496,250

**Contacts:**

Mark Olson	FHWA Texas Division, HPC-TX	(512) 916-5966
Pat Irwin	Texas DOT - San Antonio District	(210) 731-5249



# SAN DIEGO BORDER CROSSING EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The effort carried out the development of an Early Deployment Plan for ITS technologies as applied to intermodal commercial facilities and California International Border Crossings. The study resulted in the development of a strategic ITS deployment plan for the San Diego Border crossing area and will be coordinated with the Southern California Priority Corridor planning activities. The study closely followed the ITS planning process. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs were considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :** San Diego, California

**Partner(s) :** California DOT

**Start Date:** September 1995

**End Date:** July 1998

**Estimated Total  
ITS Funds:** \$200,000

**Estimated Total  
Project Cost:** \$250,000

## **Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
Larry Jellison	CalTrans, New Technology	(916) 437-3944



# SAN FRANCISCO BAY AREA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

This study resulted in a Strategic ITS Deployment Plan for the San Francisco Bay Area, which encompasses nine counties and over 100 local jurisdictions. The full range of ITS user services were considered in the development of this plan. The study closely followed the ITS planning process. The study sought stakeholder input, including the public, in order to develop a User Service Plan. Functional requirements were developed from the User Service Needs. These needs will be considered along with funding and procurement issues in order to identify and screen alternative technologies.

**Project Location :** San Francisco Bay Area, California

**Partner(s) :** California DOT and Metropolitan Transit Commission

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**Start Date:** September 1993

**End Date:** August 1996

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**Estimated Total  
ITS Funds:** \$450,000

**Estimated Total  
Project Cost:** \$562,500

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**Contacts:**

Frank Cechini	FHWA California Division, HTA-CA	(916) 498-5005
David Schnur	Metropolitan Transit Commission	(510) 464-7700



## SCRANTON/WILKES-BARRE, PENNSYLVANIA EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The Pennsylvania Department of Transportation conducted an early deployment study that developed a strategic deployment plan for ITS technologies that will address the needs and problems in the Scranton/Wilkes-Barre Metropolitan area. The proposed project encompassed the cities of Scranton, Wilkes-Barre, and parts of Lackawanna and Luzerne Counties along the I-81 and other major corridors.

**Project Location :**

Scranton/Wilkes-Barre, Pennsylvania

**Partner(s) :**

Pennsylvania DOT

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**Start Date:**

June 1995

**End Date:**

July 1997

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**Estimated Total  
ITS Funds:**

\$350,000

**Estimated Total  
Project Cost:**

\$437,500

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**Contacts:**

Mike Castellano	FHWA Pennsylvania Division, HPC-PA	(717) 221-4517
Steve Koser	Pennsylvania DOT	(717) 705-1443

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# SEATTLE, WASHINGTON TO PORTLAND, OREGON CORRIDOR EARLY DEPLOYMENT PLANNING STUDY

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**Description:** The objective of this study was to develop a plan to reduce congestion and improve safety along the I-5 corridor between Portland and Seattle utilizing intelligent transportation systems technologies. The final report for this corridor including project prospectus information on costs and potential benefits for recommended projects has been received.

**Project Location :** Seattle, Washington/Portland,Oregon

**Partner(s) :** Washington State DOT

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**Start Date:** April 1993

**End Date:** March 1996

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**Estimated Total  
ITS Funds:** \$120,000

**Estimated Total  
Project Cost:** \$150,000

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## Contacts:

Mike Morrow	FHWA Washington Division, HPM-WA	(360) 753-9411
Morgan Balogh	Washington State DOT	(206)543-0078

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## SHARED RESOURCES PROJECT

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### **Description:**

A number of state and local transportation authorities have formed partnerships with telecommunications companies to exchange access to public roadways for telecommunications capacity to be used principally for ITS projects. This report examines the legal and institutional issues encountered by a number of these partnerships. After completing the research for wireline telecommunications, the study was extended to examine these same issues when wireless tower sites are the subject of location on public rights-of-way. The results of these two analyses have been published in three reports. "Shared Resources: Sharing Right-of-Way for Telecommunications;--Guidance on Legal and Institutional Issues" and the "Final Report." FHWA-JPO-96-0015 & 14. The third report is "Wireless Shared Resources: Sharing Right-of-Way for Wireless Telecommunications," FHWA-JPO-97-0024. These reports are available from the ITS Joint Program Office.

The JPO is providing workshops to public agencies on these subjects on a request basis.

**Project Location :** Bethesda, Maryland

**Contractor(s) :** Apogee Research, Inc.

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**Start Date:** September 1994

**End Date:** December 1997

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**Estimated Total  
ITS Funds:** \$460,000

**Estimated Total  
Project Cost:** \$701,723

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### **Contacts:**

William Jones

USDOT ITS JPO, HVH-1

(202) 366-2128

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# ST. LOUIS, MISSOURI AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

This study developed a freeway management plan for the bi-state St. Louis area. The completed plan incorporates ITS technologies principally in the Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS) areas. It recommends specific strategies for incorporation into a comprehensive plan designed to meet future needs using ITS technologies. It assesses current operations such as the call box and emergency patrol operations. It makes recommendations for staffing structure and requirements. Elements considered in the plan included communications techniques, detection methods, information dissemination, ramp metering and cellular incident response.

## **Project Location :**

St. Louis, Missouri

## **Partner(s) :**

Missouri DOT, St. Louis MPO

## **Start Date:**

September 1992

## **End Date:**

May 1994

## **Estimated Total ITS Funds:**

\$269,038

## **Estimated Total Project Cost:**

\$336,298

## **Contacts:**

Bob Thomas	FHWA Missouri Division, HDA-MO	(573) 636-7104
Tom Dollus	Missouri DOT	(314) 340-4511



# TAMPA, FLORIDA AREAWIDE EARLY DEPLOYMENT PLANNING STUDY

## **Description:**

The project developed an action plan for the implementation of an integrated transportation information center for the Tampa Bay area. The plan included methods of obtaining real-time traffic condition data, integrating it into a reliable and continuous database, and disseminating condition information to the traveler in a usable and timely manner. The project contained six work tasks: (1) establish a multi-agency project advisory group to oversee the project work; (2) identify and evaluate the methods available for gathering real-time traffic condition information; (3) analyze control center alternatives, including location and operations; (4) analyze various information dissemination techniques addressing multiple media applications; (5) conduct a small scale market research effort to determine user preferences for interpreting traffic condition information; and (6) provide a final report consisting of technical memoranda and the recommended action plan. Also, a brochure oriented to the general public was developed summarizing the project action plan.

**Project Location :** Tampa, Florida

**Partner(s) :** Florida DOT

**Start Date:** June 1992

**End Date:** October 1993

**Estimated Total  
ITS Funds:** \$80,000

**Estimated Total  
Project Cost:** \$80,000

## **Contacts:**

Grant Zammit	FHWA Florida Division, HDA-FL	(850) 942-9693
Mike Pietrzyk	CUTR	(813) 974-3120



# TUCSON ADVANCED TRANSPORTATION TECHNOLOGIES IMPLEMENTATION PLAN

## **Description:**

This study resulted in the development of a Strategic ITS Deployment Plan for the Tucson metropolitan area. The study was done in four parts, including a resource and stakeholder input phase which will result in a User Service Plan. The study addressed infrastructure and services that are available or needed to develop strong interagency communications and will result in a Communications Plan. The project used this information, as well as functional requirements, funding and phasing, to develop a Deployment Plan. The administration and coordination for the project was carried out by the MPO with individual components of the study subcontracted as needed. Steering teams have been formed to provide guidance for each of the study components of this plan.

**Project Location :** Tucson, Arizona

**Partner(s) :** Arizona DOT and Pima Association of Governments

**Start Date:** September 1993

**End Date:** July 1996

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

## **Contacts:**

Alan Hansen	FHWA Arizona Division, HPR1-AZ	(602) 379-3646
Paul Cassertano	Pima Association of Governments	(602) 628-5313



# WASHINGTON, D.C. EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The District of Columbia Department of Public Works conducted an Early Deployment Study for the District of Columbia that identified and assessed potential DC surface transportation priorities that can be addressed by the application of ITS technologies, and the institutional and technical issues and alternatives required to implement them.

**Project Location :** Washington, DC

**Partner(s) :** District of Columbia Department of Public Works

**Start Date:** December 1996

**End Date:** September 1998

**Estimated Total  
ITS Funds:** \$400,000

**Estimated Total  
Project Cost:** \$500,000

**Contacts:**

Frank Mirack	FHWA District of Columbia Division, HFO-DC	(202) 523-0172
Maurice Keys	District of Columbia Department of Public Works	(202) 939-8010



## WICHITA, KANSAS EARLY DEPLOYMENT PLANNING STUDY

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**Description:**

The city of Wichita, Kansas developed a long-range, comprehensive plan for the development and implementation of ITS technologies. These will include traffic/transit management and traveler information. This plan provided a direction for incorporating this technology into the city's long-range transportation plan and transportation improvement program.

**Project Location :**

Wichita, Kansas

**Partner(s) :**

Kansas DOT and City of Wichita

**Start Date:**

May 1998

**End Date:**

July 1998

**Estimated Total  
ITS Funds:**

\$400,000

**Estimated Total  
Project Cost:**

\$500,000

**Contacts:**

Bob Alva	FHWA Kansas Division	(785) 276-7286
Matt Volz	Kansas DOT	(785) 296-6356
Scott Canefield	City of Wichita	(316) 268-4446



## **IX. OTHER RELATED PROGRAMS**

# **IX. OTHER RELATED PROGRAMS**

This section includes projects funded with Federal ITS dollars but which do not fit any of the other categories in this projects report.

# **Research**



## ITS IDEA PROGRAM

### **Description:**

The Innovations Deserving Exploratory Analysis Program solicits "IDEAs" for and funds feasibility studies of high-risk, innovative Intelligent Transportation Systems (ITS) concepts. Concepts which show continuing promise may move to phase II funding support, wherein prototype development can occur. The objective of this initiative is to establish a continuing program to identify and explore innovative concepts for ITS that are proposed by individual researchers both within and outside the usual transportation research community. This intermodal ITS program is supported by the Federal Highway Administration in the amount of \$6.5 million. Additionally, the National Highway Traffic Safety Administration and the Federal Railroad Administration have contributed \$2 million and \$1 million respectively to program support.

A progress report titled "Emerging Concepts and Products for Intelligent Transportation Systems" may be obtained by contacting:

Intelligent Transportation Systems  
Innovations Deserving Exploratory Analysis (IDEA) Program  
Transportation Research Board, National Research Council  
2101 Constitution Avenue, N.W.  
Washington, D.C. 20418  
Tel: (202) 334-3568

Additional information on the ITS IDEA Program can be found on the internet at [www.nas.edu/trb/about/itslist.html](http://www.nas.edu/trb/about/itslist.html)

**Project Location :** Washington, DC

**Partner(s) :** Transportation Research Board and National Academy of Sciences

**Start Date:** September 1992

**End Date:** December 1999

**Estimated Total  
ITS Funds:** \$9,500,000

**Estimated Total  
Project Cost:** \$9,500,000

### **Contacts:**

David Gibson

FHWA - TFHRC, HSR-10

(703) 285-2407



## ITS RESEARCH CENTERS OF EXCELLENCE

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### **Description:**

ITS Research Centers of Excellence (RCE's) program mission is to establish internationally recognized centers of excellence that provide long term ITS research solutions, promote ITS technologies and prepare ITS professionals to build and operate these intelligent transportation systems. The centers provide approximately \$1,500,000 in matching funds each year. Over one hundred students are working in RCE-related projects at the centers. Areas of emphasis are as follows:

#### University of Michigan:

Seven major areas define the University of Michigan Center's focus on near term, pre-competitive aspects of ITS: Information Technology, Controls Technology, Enterprise/Institutional Issues, Traffic Modeling, Human Factors and Behavior, Evaluation and Fleet Management.

#### Texas A & M:

The Texas A&M Center focuses on Public Transportation Services, Traffic Management Services and International Border Transportation Services.

#### Virginia Polytechnic Institute:

The Virginia Polytechnic Institute Center focuses on Incident Management, Automated Highway Systems, Smart Highways (sensors/communications), Advanced Traveler Information Systems, and Advanced Public Transportation Systems.

A report titled "The ITS Research Centers of Excellence Program" may be obtained by contacting:

ITS RCE Clearinghouse  
Texas Transportation Institute  
The Texas A&M University System  
College Station, Texas 77843-3135  
Tel: (409) 845-1734

The RCE Information Clearinghouse can be accessed via the internet at <http://rce.tamu.edu/clearingHouse/index.html>.

### **Project Location :**

Ann Arbor, Michigan; College Station, Texas; and Blacksburg, Virginia

### **Partner(s) :**

University of Michigan, Texas A&M University, and Virginia Polytechnic Institute

### **Start Date:**

September 1993

### **End Date:**

December 1999

### **Estimated Total ITS Funds:**

\$15,350,000

### **Estimated Total Project Cost:**

\$15,350,000



**Contacts:**

David Gibson

FHWA - TFHRC, HSR-10

(703) 285-2407

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## NATIONAL AVIATION & TRANSPORTATION CENTER

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**Description:** This project supports the implementation and evaluation of an International Intermodal Transportation Simulation System and NAFTA Intermodal Transportation Institute at the National Aviation and Transportation Center/Dowling College on Long Island.

**Project Location :** Long Island, New York

**Partner(s) :** New York State DOT and Dowling College

**Start Date:** September 1995

**End Date:** March 1999

**Estimated Total  
ITS Funds:** \$6,370,000

**Estimated Total  
Project Cost:** \$7,962,500

### Contacts:

Mike Schauer	FHWA New York Division, HTD-NY	(518) 431-4125	Ext. 236
Ed Roberts	New York State DOT	(518) 457-1232	



## **Completed Projects**

## AUTOMATED TRAVEL TIME ACQUISITION PROTOTYPE

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### **Description:**

This project involved the design, development, and testing of a prototype device for automating traffic speed and travel time surveys. The device makes use of a commercial off-the-shelf GPS receiver and a laptop computer in a moving vehicle. It acquires speed and location information in real time and generates time vs. distance and speed vs. distance plots. Data can be stored for subsequent playback and analysis. The device is highly portable and can be installed in a vehicle in a matter of minutes.

A prototype was built and laboratory testing successfully completed. Field testing was carried out on suburban and urban freeways and arterials. The results agree with those obtained manually and with those obtained using commercial devices hard-wired to the transmission. Furthermore, the continuous stream of position data generated by the device was found to offer a number of advantages over manually-collected "point" data. Efforts are underway to support field application of the device by the Metropolitan Washington Council of Governments and other state and local jurisdictions.

**Project Location :** Washington, DC

**Contractor(s) :** Mitretek Systems

**Start Date:** April 1995

**End Date:** June 1996

**Estimated Total  
ITS Funds:** \$141,000

**Estimated Total  
Project Cost:** \$141,000

### **Contacts:**

Raj Ghaman

FHWA – TFHRC, HSR-10

(703) 285-2408



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