

MICHIGAN
DEPARTMENT OF
TRANSPORTATION



Intelligent Transportation Systems (ITS)

Projects and Programs June 1995

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FOREWORD

This is a brief outline of the current projects and programs related to Intelligent Transportation Systems (ITS), formerly known as Intelligent Vehicle Highway Systems (IVHS), being planned, developed or implemented by the Michigan Department of Transportation (MDOT).

The projects are funded by the Federal Highway Administration, MDOT, private industry partners such as General Motors, Ford, Chrysler, GE/Ericsson, AAA of Michigan, Michigan Bell Telephone, Air Touch Teletrac, and others. Also, MDOT is in contract with The University of Michigan on several ITS projects.

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MICHIGAN INTELLIGENT TRANSPORTATION SYSTEMS CENTER DETROIT

The Michigan Intelligent Transportation Systems Center, known as the "MITS Center," is the hub of ITS technology applications at the Michigan Department of Transportation. It is a world-class traffic management center where staff oversees a traffic monitoring system for 32 miles of Detroit freeways. The system includes 24 television monitors, 11 television cameras, 14 changeable message signs, 49 ramp meters, and 1,240 inductive vehicle detectors, and a coaxial cable communication link. The center has 16,000 square feet of space with administrative offices, conference rooms, Concurrent 3280 computer and PC hardware.

The MITS Center was dedicated in 1994. An expansion of the current monitoring system to 'cover an additional 148 miles of freeways in metropolitan Detroit is underway. It will include integration with Oakland County's FAST-TRAC traffic operations center in Troy. Also, a proposed relocation of the Michigan State Police dispatch into the MITS Center will integrate incident management efforts in southeast Michigan.

1. OPERATIONAL FIELD TESTS

The Michigan Department of Transportation (MDOT) is the program administration agency for DIRECT and an active participant in FAST-TRAC and Advantage I-75.

A. DIRECT (Driver Information Radio using Experimental Communication Technologies)

DIRECT is a federal/state/private industry partnership to conduct an advanced traveler information systems (ATIS) operation field test. The goal of the project is to evaluate user benefits, institutional, and technical issues of enroute traveler information 'services in an operational setting. Emphasis is on the testing and evaluation of voice-based communication systems that offer basic services at a minimal incremental cost to the traveler, and a high potential for operational deployment.

The project will deploy, operate, and evaluate a selected group of communication technologies that satisfy these criteria. Communication methods to be tested are:

- 1) Low Powered Highway Advisory Radio (LP HAR) using an AM broadcast band frequency and radiated power of 100 milliwatts to 10 Watts.
- 2) Automatic Highway Advisory Radio (AHAR) using one of the 220 Mhz frequency pairs recently made available to the FHWA.
- 3) Radio Broadcast Data System (RBDS) combined with an analog Subsidiary Communication Authorization (SCA) voice message.
- 4) Cellular Call Server using a three-tiered menu system to query information about specific segments of the highway system.

In addition, the project will provide incident locations for assessment by the partners of the enhanced services like route guidance and navigation applications.

This plan, while using elements of the work performed in Phase I, emphasizes simplicity, low cost, very limited expansion of the infrastructure, and an increased role of the public-private partnership already in progress. This partnership will allow the introduction of evolving communications technologies, such as: the 220 Mhz band; development of the MITS (Michigan Intelligent Transportation Systems) Center as a metro-wide traffic information center; and the utilization of the MITS Center and metropolitan Detroit as a futuristic and visionary test-bed for new communication technologies.

The system design contractor is ERIM, of Ann Arbor, Michigan, and evaluation of the field test is being designed and conducted by the University of Michigan. Private industry partners for the project which are participating by contribution of equipment, cash and/or technical services include: General Motors, Ford, Chrysler, GE/Ericsson, AAA of Michigan, Air Touch Teletrac,

Ameritech, Metro Network, and the University of Michigan. The largest funding partner is the Federal Highway Administration

The design and procurement is currently in progress and it is expected that testing and evaluation will begin in the fall of 1995. The time period for completion of the test is two years.

B . FAST-TRAC

FAST-TRAC (Faster And Safer Travel through Traffic Routing & Advanced Controls) is administered by the Road Commission for Oakland County. It has completed its first phase of deployment and is well along into the second phase. MDOT is participating in the project.

Two hundred intersections are equipped with SCATS adaptive traffic signal control system and Autoscope machine-vision vehicle detectors. Ah-Scout beacons have been installed at 40 locations in the I-75 corridor in Oakland County. The beacons are communicating with 60 vehicles equipped with the Ah-Scout dynamic route guidance system.

Plans call for the installation of an additional 125 SCATS controlled traffic signals, 61 more Ali-Scout beacons, and another 740 vehicles equipped with the route guidance system by the end of 1995. A data exchange test between SCATS and Ah-Scout is underway. Systems integration work has begun and will include a link between the FAST-TRAC traffic operations center in Troy and the MITS Center in Detroit, thereby facilitating an integrated corridor traffic management in metropolitan Detroit.

C. Advantage I-75

This project will deploy ITS technology to expedite clearance and movement of commercial vehicles across state lines between Ontario, Michigan, Ohio, Kentucky, Tennessee, Georgia, and Florida.

The system integrator is SAIC. Hughes Aircraft Company is the vendor for automatic vehicle identification/driver information. In-vehicle transponders have been designed and allocated initially to 10 major carriers. Mainline weigh-in-motion (WIM) has been approved in several states including Michigan.

Michigan's portion of this effort will include WIM installation at the Erie weigh station on I-75 south of Detroit for which bids are being invited in July 1995. Fiber optic communications will be used. Installation and testing are expected in the fall of 1995.

2. ATMS/ATIS DEPLOYMENT IN METROPOLITAN DETROIT

The current system of traffic surveillance in the city of Detroit consists of 32 miles of freeways involving segments of I-94, M-10, and I-75, and I-375. An expansion of the advanced traffic management systems/advanced traveler information systems (ATMS/ATIS) to cover an additional 148

miles of the freeway system in metropolitan Detroit is underway (Figure 1). The plan includes installation of CCTV cameras, machine vision and inductive loop sensors, changeable message signs (CMS), ramp meters, and highway advisory radios (HAR).

Rockwell International will design and build the first phase of deployment to include 148 additional miles of freeway corridors in the City of Detroit, Wayne, Oakland, and Macomb Counties, including I-75, I-696, I-94, I-96, I-275, M-39, M-10 and M-59. Integration of the Oakland County's FAST-TRAC traffic operations center in Troy with the MITS Center in Detroit is also included in this phase of expansion, thus making it one of the only areas in the country to link urban and suburban traffic monitoring systems.

The Detroit ATMS/ATIS project will take about two years to complete at a cost of appx. \$33 million.

3. ATMS/ATIS EARLY DEPLOYMENT STUDY FOR METROPOLITAN GRAND RAPIDS

HNTB Michigan has been selected to conduct the ATMS/ATIS early deployment study for metropolitan Grand Rapids. This 6-month project with a budget of \$500,000 will identify opportunities for application of advanced technologies to the transportation problems in the metropolitan area.

The contract has been signed and work is scheduled to begin in the first week of June 1995.

4. ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS)

The Federal Highway Administration and the Federal Transit Administration have approved a total of \$16 million to set up APTS programs and purchase computer hardware and software in order to coordinate services using ITS and automated dispatch. The programs, which are administered by the Suburban Mobility Authority for Regional Transportation (SMART) for several counties including Macomb, Oakland, and Wayne, are as follows:

Dispatch Systems - Automate functions of reservation, scheduling, etc.

AVL System - Place hardware and software aboard SMART buses to track the fleet.

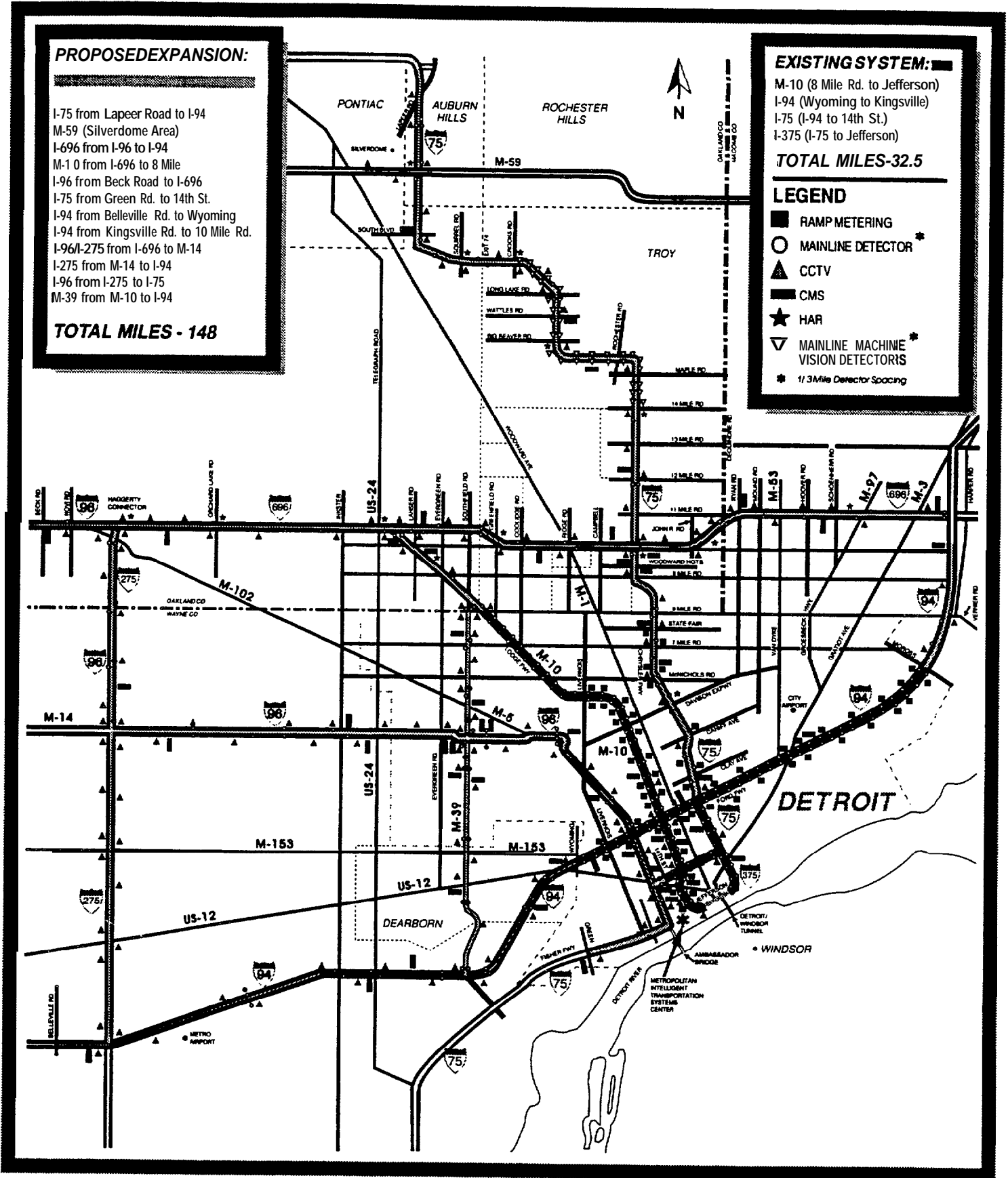
Dispatch/AVL - for affiliated agencies - Budget funds for affiliated agencies.

Regional 800 Number - 800 number to refer potential customers and interface into the SMART dispatch.

Data Collection Systems - Development activities to collect and report on available data.

Traveler Information Systems - Timely information available to SMART travelers.

FIGURE 1



S.E. Michigan ITS-ATMS/ATIS Deployment Program: 1995

5. APTS GRAPHIC DISPLAY SYSTEM FOR REAL TIME TRAFFIC INFORMATION SYSTEM

This project applied ITS technology to communicate real-time traffic information by a graphic display of the congestion levels on freeways. The display is color coded: green for normal traffic flow, red for heavy congestion, etc. The project consisted of providing the graphic display system at the dispatch centers of five public transit agencies and fleet owners and evaluating the results of savings in time by conducting “before” and “after” studies.

The agencies participating in this experiment are: Greyhound, United Parcel Service (UPS), Detroit Department of Transportation, Suburban Mobility Authority for Regional Transportation (SMART), and Commuter Shuttle Company at the Detroit Metro Airport.

The evaluation study was completed in May 1995. Requests for copies of the final report should be directed to Ross Bremer at the MITS Center, telephone (313) 256-9800.

6. ANN ARBOR SMART BUS

This project will support the Ann Arbor Transportation Authority’s operational test of the “smart bus” concept. Included are an on-board bus communications and navigation system, a central control system and a cashless payment system. The on-board system will monitor actual performance in regard to route, schedule and location. It will allow control of on-board electrical equipment such as destination signs, electronic engine controls, enunciators and fare collection systems. The on-board system will also enable the buses to interact with traffic signal controllers and to communicate with the central control system. The central control system will integrate the data from the bus fleet for coordinated supervision and will also provide real-time transit information to the public. The cashless payment system will test radio frequency proximity cards as an inter-modal payment method. It will enable creative cost-saving methods for fare payment.

The project is funded by a \$1.5 million Federal Transit Administration (FTA) capital grant. The operational test will be evaluated by the University of Michigan and the Volpe National Transportation Systems Center.

7. STATEWIDE INCIDENT MANAGEMENT EFFORTS AND MICHIGAN INCIDENT MANAGEMENT CONFERENCE, 1995

The Metropolitan Detroit Incident Management Coordinating Committee, with representatives from MDOT, FHWA, Wayne, Oakland and Macomb County Road Commissions, City of Detroit, AAA of Michigan, Michigan State Police, and others meet at the MITS Center every month on incident management issues. Several task forces developed an incident management plan for Detroit, entitled “Blueprint for Action,” published in October 1993. An updated version of the report is being prepared.

Currently, issues requiring legislative action are being reviewed by the committee.

The National Coalition for Incident Management has selected Detroit to host a Michigan Incident Management Conference in the fall of 1995.

8. U.S. - CANADA INTERNATIONAL BORDER CROSSINGS

This is a joint project between the United States and Canada to provide a transparent, seamless, border for expeditious crossing of people and goods by application of ITS technologies. A state/province team including Michigan, Ontario and New York has been established to conduct the functional requirements and individual site studies for the three Detroit area and four Niagara River area international border crossings.

The project participants include MDOT, the Ministry of Transportation of Ontario, New York Department of Transportation, FHWA, the Ambassador Bridge and Detroit-Windsor Tunnel in Detroit, the Blue Water Bridge in Port Huron-Sarnia, U.S. Immigration and Naturalization Service, Customs officials from both countries, the Peace Bridge and New York Thruway Authority, customs brokers, and trucking organizations. The first phase has been completed on the Michigan-Ontario frontier and the second phase is ready to begin design work leading to the deployment phase.

A meeting of the steering committee was held on May 25, 1995 at the Peace Bridge Authority office in Buffalo, New York. The committee is cooperating and coordinating with a NAFTA prototype and plans to set up a pilot at the Michigan and New York borders within the next year.

9. SO- CONSORTIUM FOR COMMERCIAL VEHICLES INSTITUTIONAL ISSUES

Twelve states, including Michigan, are evaluating the institutional impediments to efficient and cost-effective flow of commercial traffic at the interstate level. A Michigan working group including MDOT, State Police, Treasury, Secretary of State, Public Service Commission, and American Trucking Association has been established to review the progress. Institutional issues are being identified in the several alternative solutions. Recommendations include implementation of "one-stop shopping" and roadside enforcement.

10. ENTERPRISE

Enterprise is an international consortium of states, provinces, and private industry involved in ITS activities. Its emphasis on rural Advanced Traveler Information Systems (ATIS) will benefit Michigan with traveler information on rural segments.

11. RURAL, ITS

A high potential for ITS deployment and implementation exists in Michigan's rural areas. Michigan is exploring the possibility of integrating ITS technology with new freeway planning and design emphasizing ATMS/ATIS integration. Additional attention to the potential applications of ITS technology to enhance the safety of at-grade railroad crossings for secondary routes is being considered.

12. SMART CRUISE CONTROL PLATFORM

In collaboration with the University of Michigan, a research/test project is in progress for this important component of the ITS portfolio. This program is likely to have far reaching consequences affecting design of facilities in the future.

Smart Cruise Control Systems are expected to appear as optional equipment for the first time on luxury cars in model years 1996 through 1998. This hardware automatically controls the headway between an equipped-vehicle and the vehicle ahead, whenever the present cruise speed causes one to overtake the other. This research project will provide and exercise a test-bed package of equipment to obtain a broad initial assessment of smart cruise control and make projections of long term impact.

13. AUTOMATED HIGHWAY SYSTEM (AHS)

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 requires the U.S. Department of Transportation develop an automated highway and vehicle system, and establishes a goal of having a prototype demonstration by 1997.

MDOT is an associate of the General Motors Consortium for AHS which has been awarded the sole contract by the US DOT.

14. THE UNIVERSITY OF MICHIGAN ITS RESEARCH CENTER OF EXCELLENCE

The University of Michigan was selected in 1993 by the U.S. Department of Transportation as one of three ITS Research Centers of Excellence in the nation.

MDOT is committed to an annual funding level of \$250,000 from the State Planning and Research funds to the center. This commitment will not only benefit MDOT by research conducted in an environment of excellence, but will also stimulate the private sector in developing ITS initiatives in Michigan.

15. ITS MICHIGAN

On March 9, 1995 the creation of the ITS Michigan was announced at a press conference held at the MITS Center in Detroit. It is a state chapter of the national organization, ITS America, a non-profit educational and scientific society which began operations in 1991 to coordinate and accelerate the development, deployment, and acceptance of advanced transportation technologies in the U.S.

The purpose of the society includes:

- To promote professional development of those interested in ITS.
- To advocate the development and deployment of ITS for benefit to Michigan, and to serve

as a voice for Michigan's ITS concerns at all levels.

To build coalitions for the furtherance of ITS that take advantage of Michigan's unique blend of resources including, but not limited to, its transportation system, the domestic auto industry, the international borders with Canada, and a strong university system.

To educate the people of Michigan on the benefits ITS holds for all citizens.