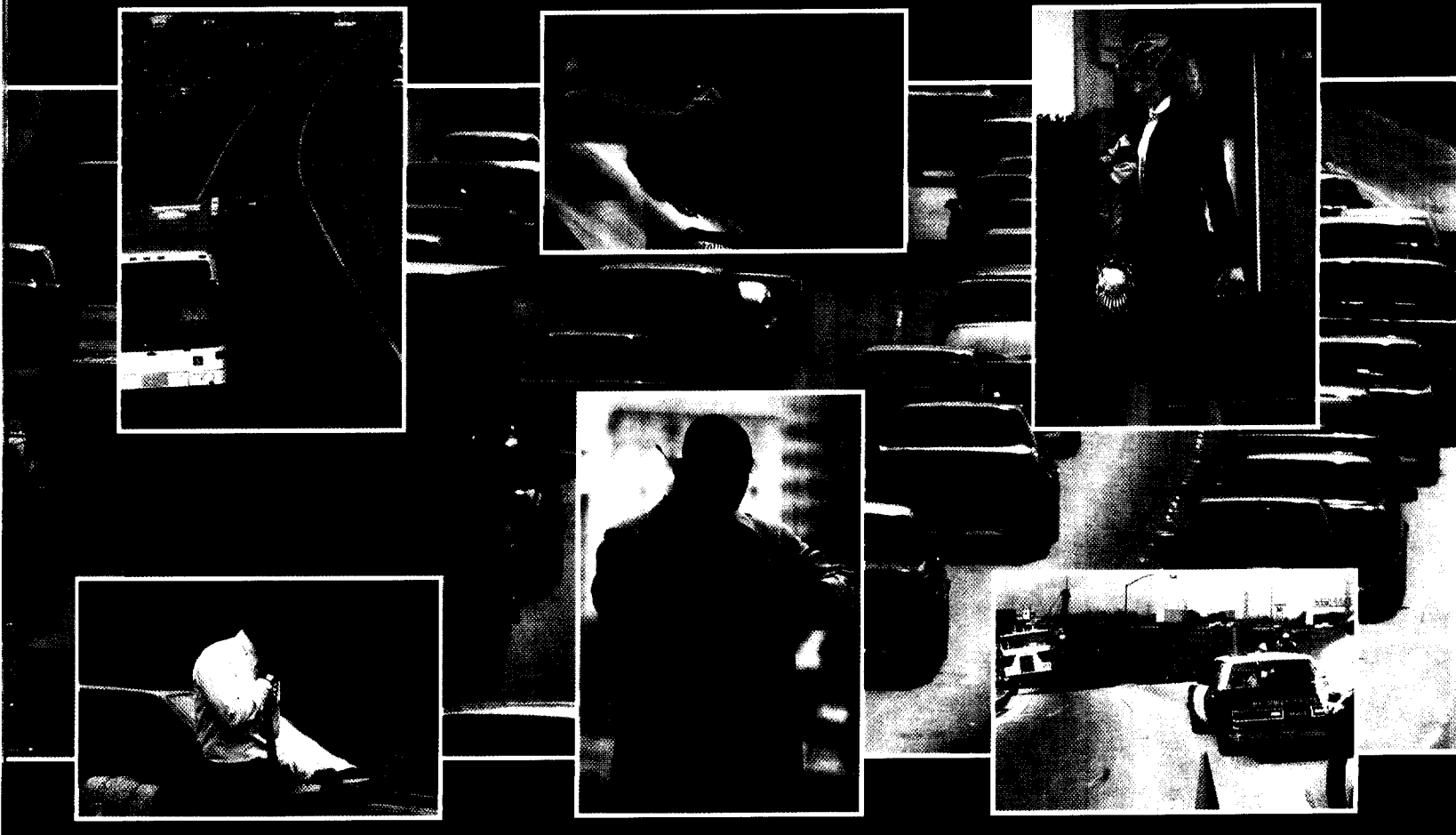
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITI	Intelligent Transportation Infrastructure
ITS	Intelligent Transportation Systems
ITS America	The Intelligent Transportation Society of America [formerly IVHS America]
IVHS	Intelligent Vehicle-Highway Systems
IVSAWS	In-Vehicle Safety Advisory and Warning Systems
JPO	Joint Program Office [for ITS]
LIDAR	Light Detection and Ranging
MCSAP	Motor Carrier Safety Assistance Program
MTIS	Multimodal Traveler Information System
NAFTA	North American Free Trade Agreement
NAHSC	National Automated Highway System Consortium
NHTSA	National Highway Traffic Safety Administration
NTCIP	National Traffic Control Interchange Protocol
OBC	On-Board Computer
O&M	Operations and Maintenance
PATH	Partners for Advanced Transit and Highways
PCD	Personal Communications Device
PDA	Personal Digital Assistant
PL	Public Law
RBDS-TMC	Radio Broadcast Data Service - Traffic Message Channel
R&D	Research and Development
RDS	Radio Data Service
RF	Radio Frequency
RSPA	Research and Special Programs Administration
RTD	Regional Transportation District
RT-TRACS	Real Time Traffic Adaptive Control System
SAFER	Safety and Fitness Electronic Records System
SCA	Subsidiary Communication Authorization
SDOs	Standards Developing Organizations
SDTS	Spatial Data Transfer Standard
STICSCA	Traffic Information Channel
TMC	Traffic [or Transportation] Management Center
TRP	Technology Reinvestment Program [ARPA]
VDTV	Variable Dynamics Test Vehicle
VME	Vehicle Motion Environment
VRC	Vehicle-to-Roadside Communications
VSAT	Very Small Aperture Terminal [satellite]
WIM	Weigh in Motion
WMATA	Washington Metropolitan Area Transit Authority

U.S. Department of Transportation



Building The Intelligent Transportation Infrastructure

Help Is Here

If you're among the 80 percent of Americans who live in a metropolitan area, you've experienced the frustration of losing precious time while trapped in traffic. In the past 10 years, the number of vehicles traveling on our interstates has grown by more than 30 percent. Demand is expected to increase by another 50 percent over the next generation.

Traffic congestion, believe it or not, will only get worse.

For those of us trying to get from here to there, the future looks bleak.

For commuters, it could mean more lost time.

For crash or breakdown victims, it means longer waits for the arrival of emergency vehicles.

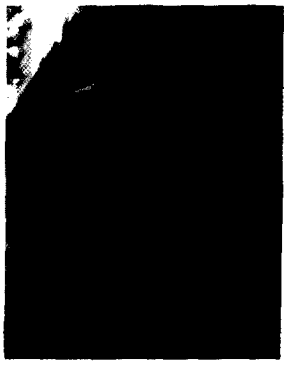
Wasting too much TIME in traffic?

For businesses, it means more lost time shipping goods from one city to another.

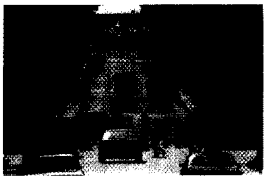
For the environment, it means more pollution. Plain and simple.

Americans lost more than 2 billion hours to traffic jams last year—that's 83.3 million days, or nearly 228,000 years. People pressed by all of the demands in their lives cannot afford to waste any more time in traffic. Traffic delays make you late for work in the morning and late for dinner in the evening. It means less time for all of the things that are important to you.

It's time for Operation TimeSaver.



Deploying ITS Technologies



At a time when traffic volume continues to grow and budgets continue to shrink, the transportation community has turned to Intelligent Transportation Systems (ITS) to increase the efficiency of our existing highway, transit and rail systems. ITS uses advanced electronics and information technologies to improve the performance of vehicles, highways and transit systems.

ITS components that are already in place have created the platform for more advanced and integrated deployment of ITS. The U.S. Department of Transportation has therefore determined that now is the time to establish building the Intelligent Transportation Infrastructure (ITI) as a national goal.

The ITI consists of ITS components such as traffic signal control, freeway management, transit management, incident management and electronic payment and toll technologies.

A major new initiative is being launched to urge governors, mayors, and county executives to invest in intelligent transportation solutions.

Can't get products to market on TIME?

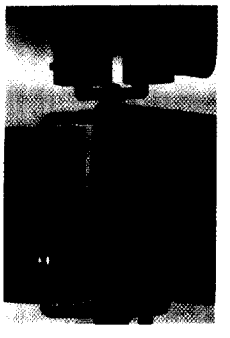
The initial focus on metropolitan areas will soon expand into rural areas and applications to the trucking and bus industries.

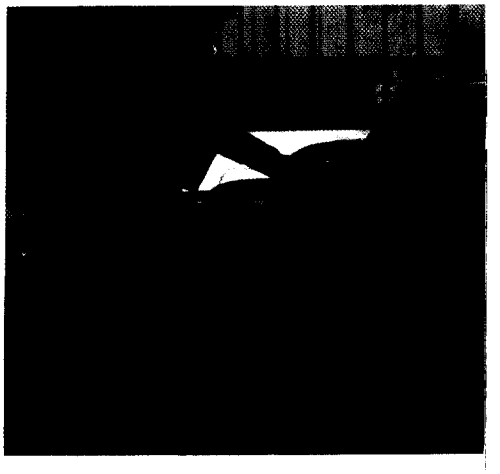
Between now and 2005, an Intelligent Transportation Infrastructure will be built throughout the nation, as state and local traffic and transit officials deploy an arsenal of new tools to keep the flow of people and goods moving more smoothly, safely, and with less impact on the environment.

For those of you living and traveling in metropolitan areas, building the ITI is expected to save you 15 percent of your travel time.

Communities that plan smart and buy smart will be able to connect these components and realize the enormous benefits available from the smooth exchange of data in an integrated intelligent transportation system.

Transportation has moved into the Information Age.





What is the ITI Initiative?

Until recently, the tools available to provide better transportation have been fairly straight forward: build more highways or expand existing ones. This scenario is no longer true. Today, traffic volume in most areas is growing at a time when transportation budgets are shrinking. In most areas, roads already fill the existing rights of way. Clearly, the highway system that was built over the past 40 years cannot carry us over the next 20.

Enter the ITI.

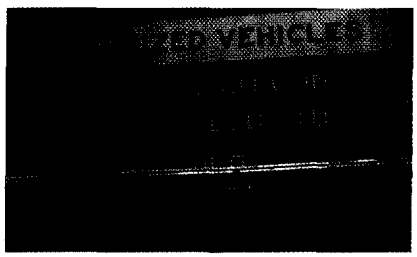
The ITI Initiative Is:

- The latest travel information at your fingertips through your home computer, cable television, kiosk, telephone, car phone, beeper.
- Traffic control centers that use radar beacons, closed circuit video cameras and in-road sensors to monitor major highways and arterials and then provide up-to-the-minute traffic and road condition information to travelers.
- Enhanced dispatch systems that quickly detect crashes or breakdowns and alert emergency service providers.
- Smart buses and trains equipped with tracking devices that allow transit control centers to monitor movement and quickly adjust schedules.
- Smart traffic signals that can adjust if traffic begins to increase in one direction.
- Smart emergency response vehicles that can message a traffic signal to stay green so they can pass through an intersection.
- Changeable message signs that tell motorists about conditions ahead and inform transit riders when the next bus or train will arrive.
- Smart cards to speed up electronic toll and parking lot fee collection; electronic cards for use on mass transit to eliminate the need for exact change.
- Smart parking lots to tell you how many spaces are left and where to find them.
- The ability to interconnect all of these components will provide the public with the full range of alternative travel information.

Can't get to work on TIME?

In this world of limited resources, we must get more from our transportation investments. We must learn to foster the private investment both in research and deployment that will make the marriage of transportation and technology an asset to consumers and a self-sustaining industry that produces competitive advantages at home and abroad.

We must learn to take advantage of the ITI.



The Goal

As we work together to build the Intelligent Transportation Infrastructure, benefits will accrue to people and businesses across the country. The objective is to shave that extra 15 minutes off your morning and evening commute, that extra truck trip that makes your business profitable, those extra few seconds off emergency vehicle response times that can mean the difference between life and death.

Our goal is to save you time.

Traffic robbing you of personal TIME?

The ITI Provides:

For Commuters:

- More time at home with the kids.
- Reduced stress.
- Better, easily accessible travel information to make intelligent choices.
- Less bus or train bunching.
- Eliminate the need for exact change.
- Accurate guidance about alternate routes.
- Adaptive traffic signals that adjust to changing situations.

For Personal Safety:

- Improved emergency response time.
- Fewer accidents on our roads.
- Improved safety for transit users.

For Businesses:

- Faster movement of goods by truck or rail.
- Automation of weight and safety inspections to reduce delays along the highway.
- Increased productivity by reducing the $40 billion lost to congestion every year.

For the Environment:

- Fewer idling vehicles means less pollution and cleaner air.

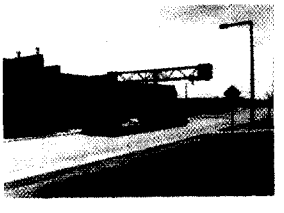
For Taxpayers:

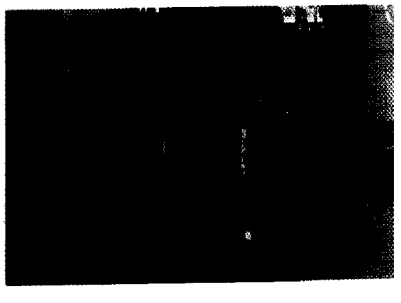
- Money saved; ITI technology is cost-effective, and it's available now.

For Rural Areas:

- Rapid response to incidents and breakdowns.
- Transportation access for elderly and handicapped persons.

Building the ITI will save you time.





Building the ITI

The best news about Intelligent Transportation Systems technologies is that they are already available and are being used across the country to save people time.

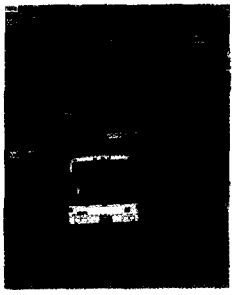
In metropolitan areas where transportation planners have deployed ITS and are building the Intelligent Transportation Infrastructure, people are already noticing the difference.

In Seattle, an advanced freeway management system has increased interstate speeds by up to 20 percent, reducing travel time by 50 percent for cars, trucks and buses.

The New York City Transit Authority estimates its new MetroCard system will save $70 million per year from fare evasion and increase ridership revenues by $49 million.

In Kansas City, implementation of a transit management system helped transit officials reduce annual operating costs by $400,000, thus avoiding $1.5 million in new bus purchases. Response time to emergencies was cut from four minutes to one minute.

Isn't it TIME for intelligent solutions?



Minnesota Guidestar has Minneapolis/St. Paul residents driving 35 percent faster during rush hour, cutting their commute dramatically. Accident rates have dropped 25 percent; emergency response time is down by 20 minutes, and freeway capacity has increased by 22 percent.

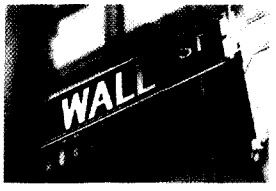
In Lexington, KY, coordinated computerized traffic signals reduced "stop and go" traffic delays by 40 percent and reduced accidents by 31 percent between 1985 and 1994.

In Houston, congestion has actually declined since 1984 as a result of an integrated network of traffic control systems called TranStar.

In Michigan's Oakland County, the FAST-TRAC project has saved commuters an average of five minutes off a 24-minute commute. That's a savings of 50 minutes every week. Since traffic is moving faster, experts predict a 13 percent reduction in emissions, resulting in less pollution.

This is only the beginning.

Cooperation at all Levels



The ITI is coming to a traffic jam near you. But it is an effort that requires government at all levels—federal, state and local—and the private sector working together as partners.

Operation TimeSaver is designed to encourage state and local governments to put intelligent transportation solutions to use to save you time.

Over the past five years, the federal government has established the technical underpinnings to build the ITI. Late last year Congress passed, and the President signed, the legislation designating the National Highway System. This legislation will speed up construction of the ITI in metropolitan and rural areas.

State and local governments now have new mechanisms in place for funding transportation projects. State Infrastructure Banks are designed to cut through red tape and help encourage the private sector in the campaign to save you time.

States can count private sector funds toward their required state share of construction projects. For some projects, ITI can be funded totally with federal financing.

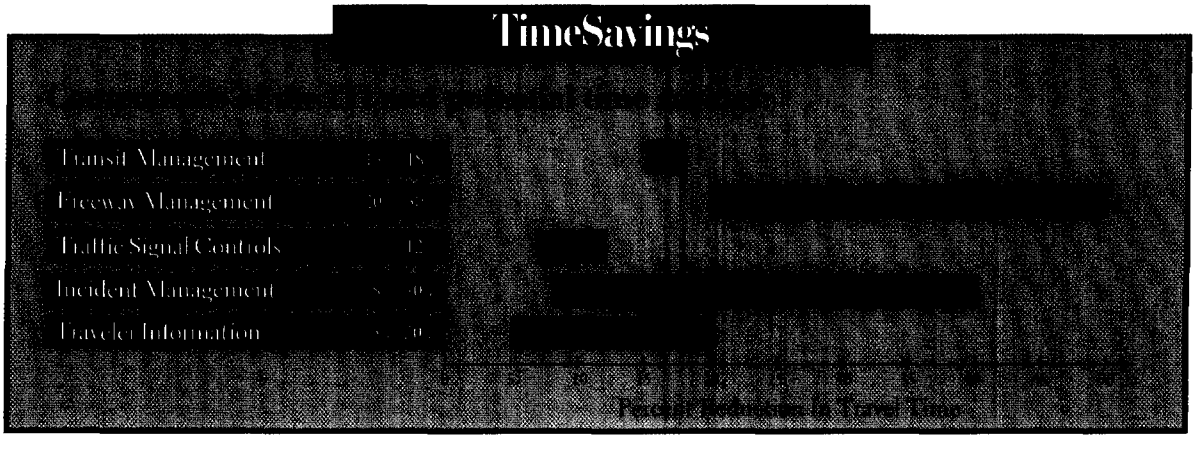
The U.S. Department of Transportation is petitioning the Federal Communications Commission for a special phone number, so that anywhere in the country, you can instantly access travel information.

An Operation TimeSaver web site will help U.S. DOT provide technical assistance to state and local governments as they build the ITI.

It's TIME for Operation TimeSaver!

Together we can build the Intelligent Transportation Infrastructure.

TimeSavings



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U.S. Department of Transportation's

Intelligent Transportation Infrastructure Deployment Database: *Interim Report*

Operation TimeSaver

U.S. Department of Transportation

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U.S. Department of Transportation

Intelligent Transportation Infrastructure Deployment Database: Interim Report

Prepared by the Federal Highway Administration,
Office of Traffic Management and ITS Applications
with Data Collection by Oak Ridge National Laboratory,
Knoxville, Tennessee

June 1996
Washington, DC

EXECUTIVE SUMMARY

In January 1996, U.S. Department of Transportation Secretary Federico Pena unveiled the Operation TimeSaver initiative at the annual meeting of the transportation Research Board (TRB). The Secretary set a national goal of building and deploying an Intelligent Transportation Infrastructure (ITI) across the US "to save time and lives and improve the quality of life for Americans.

Operation TimeSaver challenges state and local transportation planners to "buy smart" by investing in an arsenal of new technological tools to keep the flow of people and goods moving more smoothly, safely, and with less impact on the environment.

Intelligent Transportation Infrastructure (ITI) is the infrastructure portion of Intelligent Transportation Systems (ITS) in metropolitan areas. The ITI refers to those portions of ITS-related hardware, software, services, etc. that today and increasingly in the future, will manage and support the transportation-related activities. This is typically happening first in metropolitan areas but is expanding to include specific commercial vehicle services and rural needs.

This report summarizes the deployment of Intelligent Transportation Infrastructure (ITI) in the largest 75 Metropolitan Areas United States and answers the question: "What Intelligent Transportation Infrastructure is operational and in the field today?" This report showcases the deployment of the ITI components.

Regional Multimodal Traveler Information Center (RMTIC)
Traffic Signal Control System
Freeway Management System
Transit Management System
Incident Management Program
Electronic Fare Payment System
Electronic Toll Collection (ETC) System
Railroad Grade Crossing Warning System and
Emergency Management System

At the printing of this report in June 1996, two components are not represented, Railroad Grade Crossing Warning System and Emergency Management System. Data collection efforts for these two components are currently underway and will be reported in later versions of this summary.

It is hoped the reader will be able to review the report and quickly identify what ITI Technologies are deployed, and where they are deployed. The reader will also be able to obtain detailed information about any of the projects listed on this exhibit by using the Intelligent Transportation Infrastructure Deployment Monitoring System being developed by Oak Ridge National Laboratory (ORNL) for the U.S. DOT. This database can be accessed by the Internet address http://128.169.84.18/. The data used in this report and the deployment monitoring database is based on unverified survey data current as of June 1996. Transportation professionals are encouraged to comment on the database. The intention is to update and distribute this report on a regular basis.

The attached tables summarize ITI deployments in 75 large metropolitan areas. As you can see, a number of areas have already made partial investments in the ITI. There are 41 Freeway Management Centers, 39 Advanced Public Transportation, 57 Centralized Traffic Signal Control Systems, Incident Management Programs 39, and 28 with Electronic Toll Collection Systems.

Note: Funding of the ITI is through various public/ private sources to include Federal, State and Local funds.

Foreword

The purpose of this report is to show the deployment of Intelligent Transportation Infrastructure (ITI) in the United States. The report answers the question: "What Intelligent Transportation Infrastructure is operational and in the field today?" The report will showcase the deployment of ITI components (defined and listed below) in the largest 75 Metropolitan Areas in the United States. A reader should be able to view the report and quickly identify what ITI Technologies are deployed, and where they are deployed. The reader will also be able to obtain detailed information about any of the projects listed on this report by using the Intelligent Transportation Infrastructure Deployment Monitoring System being developed by Oak Ridge National Laboratory (ORNL).

Funding of the ITI is through various public/ private sources to include Federal, State and Local funds. The data for this report and the deployment monitoring system is currently being collected through a contract with ORNL. This collection effort began in September of 1995. However, data collection under this effort did not include the Railroad Grade Crossing Warning System and the Emergency Management System ITI components. The data used in this report and the deployment monitoring database is based on survey data current as of June 1996.

Construction of the World Wide Web (WWW) home page is complete. As mentioned earlier, the ITI Deployment Monitoring System will be linked to many other transportation and engineering related web sites.

More information on the ITI Deployment Monitoring System can be obtained by contacting Barry Zimmer of the FHWA Office of Traffic Management and ITS Applications, at e-mail address bzimmer@intergate.dot.gov. Mr. Zimmer can also be reached by faxing comments or questions to 202-366-8712.

Table of Contents

	Page
Executive Summary	iii
Foreword	v
Definition of the ITI Components	1
ITI Deployment Monitoring System	3
Region 1	13
Region 3	25
Region 4	35
Region 5	47
Region 6	57
Region 7	65
Region 8	73
Region 9	81
Region 10	93
The Next Step for the ITI Deployment Monitoring System	99

For more detailed information, or to provide comments, this data can be accessed on the World Wide Web at:

http://128.169.84.18/

List of Tables

Page

Table 1 - 75 Metropolitan Areas ITI (Alphabetical Listing) 4
Table 2 - 75 Metropolitan Areas ITI by Region 8

Region 1
Table - 1 Traffic Signal Control Systems 15
Table - 2 Freeway Management Systems 17
Table - 3 Advanced Public Transportation Systems 18
Table - 4 Incident Management Programs 20
Table - 5 Electronic Toll Collection Systems 22

Region 3
Table - 1 Traffic Signal Control Systems 27
Table - 2 Freeway Management Systems 29
Table - 3 Advanced Public Transportation Systems 32
Table - 4 Incident Management Programs 33
Table - 5 Electronic Toll Collection Systems 34

Region 4
Table - 1 Traffic Signal Control Systems 37
Table - 2 Freeway Management Systems 41
Table - 3 Advanced Public Transportation Systems 43
Table - 4 Incident Management Programs 44
Table - 5 Electronic Toll Collection Systems 46

Region 5
Table - 1 Traffic Signal Control Systems 49
Table - 2 Freeway Management Systems 51
Table - 3 Advanced Public Transportation Systems 53
Table - 4 Incident Management Programs 55
Table - 5 Electronic Toll Collection Systems 56

Region 6

Table - 1 Traffic Signal Control Systems 59
Table - 2 Freeway Management Systems 61
Table - 3 Advanced Public Transportation Systems 62
Table - 4 Incident Management Programs 63
Table - 5 Electronic Toll Collection Systems 64

Region 7

Table - 1 Traffic Signal Control Systems 67
Table - 2 Freeway Management Systems 68
Table - 3 Advanced Public Transportation Systems 69
Table - 4 Incident Management Programs 70
Table - 5 Electronic Toll Collection Systems 71

Region 8

Table - 1 Traffic Signal Control Systems 75
Table - 2 Freeway Management Systems 76
Table - 3 Advanced Public Transportation Systems 77
Table - 4 Incident Management Programs 78
Table - 5 Electronic Toll Collection Systems 79

Region 9

Table - 1 Traffic Signal Control Systems 83
Table - 2 Freeway Management Systems 86
Table - 3 Advanced Public Transportation Systems 89
Table - 4 Incident Management Programs 91
Table - 5 Electronic Toll Collection Systems 92

Region 10

Table - 1 Traffic Signal Control Systems 95
Table - 2 Freeway Management Systems 96
Table - 3 Advanced Public Transportation Systems 97
Table - 4 Incident Management Programs 98
Table - 5 Electronic Toll Collection Systems (None in this Region) .....

Definition of the Intelligent Transportation Infrastructure (ITI) Components

The U.S. DOT has defined nine infrastructure components for Intelligent Transportation System (ITS) traffic management and traveler information services in a metropolitan area. The elements are basic ITS capabilities which are currently available for deployment or are already in operation. The ITI components are defined as follows:

Funding of the ITI is through various public/ private sources to include Federal, State and Local funds. The Regional Multimodal Traveler Information Center (RMTIC) provides a centralized source of roadway and transit information, and gives a comprehensive and integrated view of the road and traffic conditions throughout a metropolitan area or region. The RMTIC is considered a key feature of the ITI in that it will be the focal point for information collection and dissemination. The RMTIC will link data from the other ITI features into a comprehensive regional information system, thereby facilitating the timely distribution of critical travel-related information to the traveler and transportation-related commercial users.

2. Traffic Signal Control System:

Current state-of-the-art traffic signal control systems have the capability to dynamically modify the signal timings in response to changing traffic demand and to coordinate operation between adjacent signals to maximize the roadway (network) throughput. At a minimum, these coordinated signal control systems can provide for the selection of several time-of-day or special signal timing patterns that can optimize operations along major arterial routes and over traffic networks.

3. Freeway Management System:

Freeway traffic managers in a metropolitan area have the capability to:

- monitor traffic and other environmental conditions on the freeway system,
- identify recurring and non-recurring flow impediments,
- implement various control and management strategies (such as ramp metering and/or lane control),
- provide critical information to travelers through infrastructure-based dissemination methods, such as variable message signs and highway advisory radio.

4. Transit Management System:

Transit fleet management systems for metropolitan areas manage bus operations based on real-time bus locations. Automatic Vehicle Location (AVL) data is used to optimize bus routes by providing reliable bus position information to the dispatch. The dispatcher with computer assistance can compare the vehicle location with schedule information to track schedule adherence, and when necessary take corrective actions to either get the vehicle back on schedule or dispatch additional resources to cover the route. In addition, any pertinent schedule information would be provided to the RMTIC for dissemination in near real-time to the traveler,

5. Incident Management Program:

Metropolitan areas currently have systems for quickly identifying and responding to incidents that occur on freeways and major arterials. The objectives are to rapidly respond to incidents with the proper personnel and equipment, to aid accident victims, and to facilitate the rapid clearance of the accident from the roadway. Timely execution of these activities will save lives while minimizing the buildup of queues and reducing the delays and frustrations of the traveling public. To accomplish this, real-time input from the freeway and arterial surveillance systems and the agencies responsible for managing them is critical.

6. Electronic Fare Payment System:

Electronic fare payment systems will be in operation within metropolitan areas for collection of transit fares, parking lot fees, etc. The systems will include hardware and software for roadside, in-vehicle, and in-station use; and passenger/driver payment cards, which possibly would include financial and card accounting systems. Electronic fare collection eliminates the need for travelers to carry exact fare (change) amounts and facilitates the subsequent implementation of a single fare payment medium for all public transportation services. Manual cash payment would continue to be supported.

7. Electronic Toll Collection (ETC) System:

Electronic payment systems are in operation within or around a number of metropolitan areas (and on segments of rural interstate systems) for automated toll collection. Toll payment is processed via payment cards or tags as the vehicle passes the toll station at a safe speed (ultimately at normal highway speed), thereby decreasing delays and improving roadway throughput.

8. Railroad Grade Crossing Warning System:

Improvements to Railroad Grade Crossing safety would feature the use of an in-vehicle warning system to encourage safe driving behavior by better focusing driver attention on the danger of trains approaching a railroad crossing.

9. Emergency Management System:

The proper authorities would have immediate notification of the precise location of crashes and breakdowns via an in-vehicle "MAYDAY" button. This technology would primarily be aimed at rural America where accidents and breakdowns, on the average, are reported less quickly than in metropolitan areas.

Intelligent Transportation Infrastructure (ITI) Deployment Monitoring System

The establishment of a national inventory on Intelligent Transportation Infrastructure will not only help answer many of the congressional requests involving the ITS program, but it will also provide the U.S. DOT with the necessary raw data on the deployment of ITI for benefit-cost purposes. The ITI Deployment Monitoring System will solidify the U.S. DOT's role in energizing the information sharing of ITI Deployment at all levels of government.

It is certainly useful for transportation officials to be able to obtain current and up to date information regarding the deployment of Intelligent Transportation Infrastructure. On the following pages is a sample of the infrastructure deployment data that can be accessed using the deployment monitoring database. Funding for the ITI is from a variety of both public and private sources to include Federal, State, and Local funds. The first table is an alphabetical listing of the 75 Metropolitan Areas and their ITI Deployment. The second table is an alphabetical listing by FHWA Region of the 75 Metropolitan Areas and their ITI Deployment. Also available is a more detailed handout, by Region, of each Metropolitan Area's ITI Deployments. The data tables detail the deployment of ITI in each state and region of the United States. The data collection for the Metropolitan Areas that are included in the 75 largest is complete.

* Note: The data used in the following database and handouts are based on unverified survey data, which is current as of June 1996.

CODE FOR DATABASE

Y = Yes, Metropolitan area has a particular ITI deployment.
N = No, Metropolitan area does not have a particular ITI deployment.
Total Number = Total ITI deployed within a Region.

TABLE 1 - 75 Metropolitan Areas ITI

Metropolitan Area	Intelligent Transportation Infrastructure				
	Freeway Management Centers	Advanced Public Transportation	Centralized Traffic Signal Control Systems	Incident Management Programs	Electronic Toll Collection Systems
Albany, Schenectady, Troy	N	Y	N	Y	Y
Allentown, Bethlehem, Easton	N	N	N	N	N
Atlanta	Y	Y	Y	Y	Y
Austin	N	N	Y	Y	N
Bakersfield	N	N	N	N	N
Baltimore	Y	Y	Y	Y	Y
Baton Rouge	N	N	N	N	N
Birmingham	Y	N	Y	Y	N
Boston, Lawrence, Salem	Y	Y	Y	Y	Y
Buffalo, Niagara Falls	Y	Y	N	Y	Y
Charleston	Y	Y	Y	Y	N
Charlotte, Gastonia, Rock Hill	Y	N	Y	Y	N
Chicago, Gary, Lake County	Y	Y	Y	Y	Y
Cincinnati, Hamilton	Y	Y	Y	N	N
Cleveland, Akron, Lorain	N	Y	N	N	Y
Columbus	Y	Y	Y	Y	N
Dallas, Forth Worth	Y	Y	Y	Y	Y
Dayton, Springfield	N	N	Y	N	N
Denver, Boulder	Y	Y	Y	Y	Y
Detroit, Ann Arbor	Y	Y	Y	Y	Y
El Paso	Y	Y	Y	N	N
Fresno	Y	N	Y	N	N
Grand Rapids	N	N	Y	N	N
Greensboro, Winston-Salem, High Point	Y	Y	Y	Y	N

Metropolitan Area	Intelligent Transportation Infrastructure				
	Freeway Management Centers	Advanced Public Transportation	Centralized Traffic Signal Control Systems	Incident Management Programs	Electronic Toll Collection Systems
Greenville, Spartanburg	N	N	Y	Y	N
Harrisburg, Lebanon, Carlisle	N	N	N	N	N
Hartford, New Britain, Middletown	Y	Y	Y	N	N
Honolulu	Y	N	Y	N	N
Houston, Galveston, Brazoria	Y	Y	Y	Y	Y
Indianapolis	N	N	N	N	N
Jacksonville	Y	N	Y	Y	N
Kansas City	N	Y	Y	Y	Y
Knoxville	N	N	N	N	N
Las Vegas	Y	N	Y	N	N
Little Rock, North Little Rock	N	N	Y	N	N
Los Angeles, Anaheim, Riverside	Y	Y	Y	Y	Y
Louisville	N	Y	Y	N	N
Memphis	N	N	N	N	N
Miami, Fort Lauderdale	Y	Y	Y	Y	Y
Milwaukee, Racine	Y	Y	N	Y	N
Minneapolis, St. Paul	Y	Y	Y	Y	N
Nashville	N	N	Y	N	N
New Haven, Meriden	Y	Y	Y	Y	N
New Orleans	N	N	Y	N	Y
New York, Northern New Jersey, Long Island	Y	Y	Y	Y	Y
Norfolk, Virginia Beach, Newport News	Y	Y	Y	N	N
Oklahoma City	N	N	Y	N	Y
Omaha	N	N	Y	N	N
Orlando	Y	N	Y	Y	Y

Metropolitan Area	Intelligent Transportation Infrastructure				
	Freeway Management Centers	Advanced Public Transportation	Centralized Traffic Signal Control Systems	Incident Management Programs	Electronic Toll Collection Systems
Philadelphia, Wilmington, Trenton	Y	N	N	Y	Y
Phoenix	Y	Y	Y	Y	N
Pittsburgh, Beaver Valley	N	Y	Y	N	N
Portland, Vancouver	Y	Y	Y	Y	N
Providence, Pawtucket, Fall River	Y	N	Y	Y	N
Raleigh-Durham	N	Y	Y	Y	N
Richmond, St. Petersburg	N	N	Y	N	N
Rochester	N	Y	Y	N	N
Sacramento	Y	N	Y	Y	N
Salt Lake City, Ogden	N	N	Y	N	N
San Antonio	Y	Y	Y	Y	N
San Diego	Y	N	Y	Y	Y
San Francisco, Oakland, San Jose	Y	Y	Y	Y	Y
Scranton, Wilkes-Barre	N	Y	N	N	N
Seattle, Tacoma	Y	Y	Y	Y	N
Springfield	N	Y	N	N	Y
St. Louis	Y	N	N	Y	N
Syracuse	N	N	N	N	Y
Tampa, St. Petersburg, Clearwater	Y	Y	Y	Y	Y
Toledo	N	N	Y	N	N
Tucson	N	Y	Y	N	N
Tulsa	N	N	Y	N	Y
Washington	Y	Y	Y	Y	Y
West Palm Beach, Boca Raton, Delray	N	N	Y	N	Y
Wichita	N	N	N	N	Y

Metropolitan Area	Intelligent Transportation Infrastructure				
	Freeway Management Centers	Advanced Public Transportation	Centralized Traffic Signal Control Systems	Incident Management Programs	Electronic Toll Collection Systems
Youngstown, Warren	N	N	N	N	Y
TOTAL	41	39	57	39	28