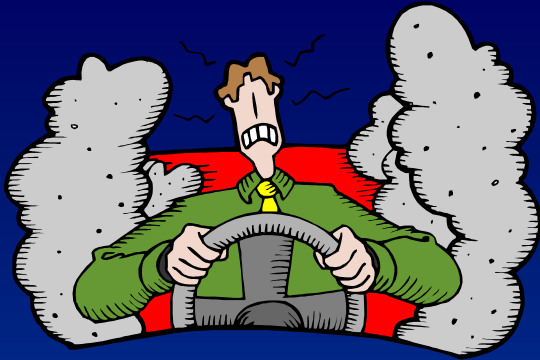


Intelligent Transportation Systems (ITS) Program

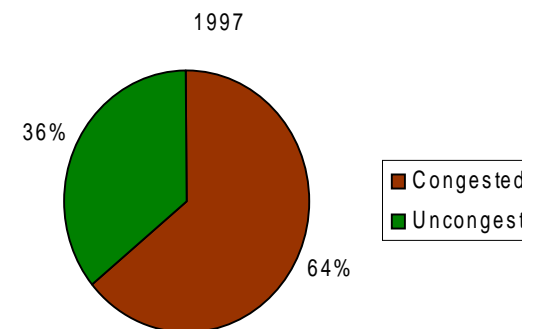
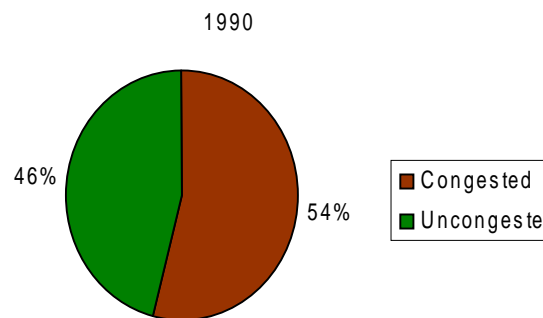
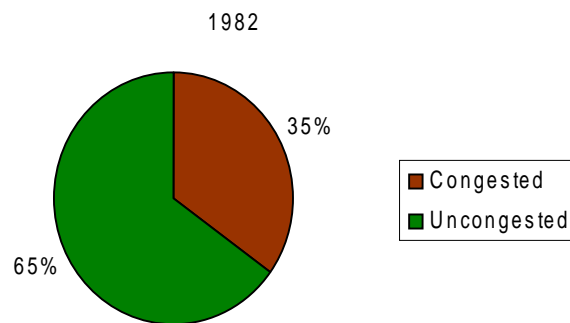
John A. Halkias, Ph.D., P.E.

*Office of Travel Management
Federal Highway Administration
U.S Department of Transportation*



Congestion

- \$72 Billion per Year in Lost Time and Fuel
 - About \$755 per driver per year or \$3 per working day
- 260% Increase in Delay from 1982-1997
- 200% Increase in Wasted Fuel
 - 6.7 Billion gallons of fuel wasted due to congestion



Possible Solutions



- Increase Capacity
 - It would take an annual addition of 1,087 lane-miles of freeway and 1,432 lane miles of arterials each year to maintain current mobility levels
 - This equates to an additional 181 miles of a six-lane freeway and 360 miles of a four-lane arterial
- Reduce Demand
 - Lower the Number of Vehicles (e.g., transit, HOV, land use pattern changes)
 - Need to eliminate an additional 6.7 million trips per year
- Manage Both More Effectively
 - Flexible work hours, telecommuting, etc.
 - **Intelligent Transportation Systems (ITS)**

ITS

- Combines information and communications technologies to manage surface transportation networks and improve operational efficiency and safety
- Includes a wide variety of current and evolving technologies that, when effectively integrated and deployed, offer a number of benefits including more efficient use of energy resources and significant improvement in safety, mobility, accessibility, productivity, and air quality

TEA-21 ITS PROGRAM

ITS Deployment Program (\$679M)

ITS
Integration
Program
(Travel
Management)

Commercial Vehicle
Infrastructure
Program

Commercial Vehicle
Information Systems
and Networks (CVISN)

ITS Research &
Development
(\$603M)

- R & D
- Architecture & Standards
- Training
- Technical Assistance

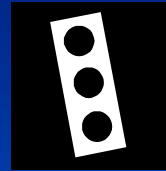
Overall ITS Program

- Travel Management
 - ➔ – Metropolitan
 - Rural
- Commercial Vehicle Operations
- IVI
- Architecture
- Standards
- Training/Technical Assistance

Metropolitan ITS Strategies



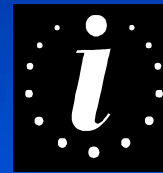
*Freeway
Management*



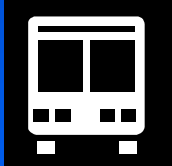
*Arterial
Management*



*Incident
Management*



*Traveler
Information*



*Transit
Management*



*Emergency
Management*



*Electronic Toll
Collection*

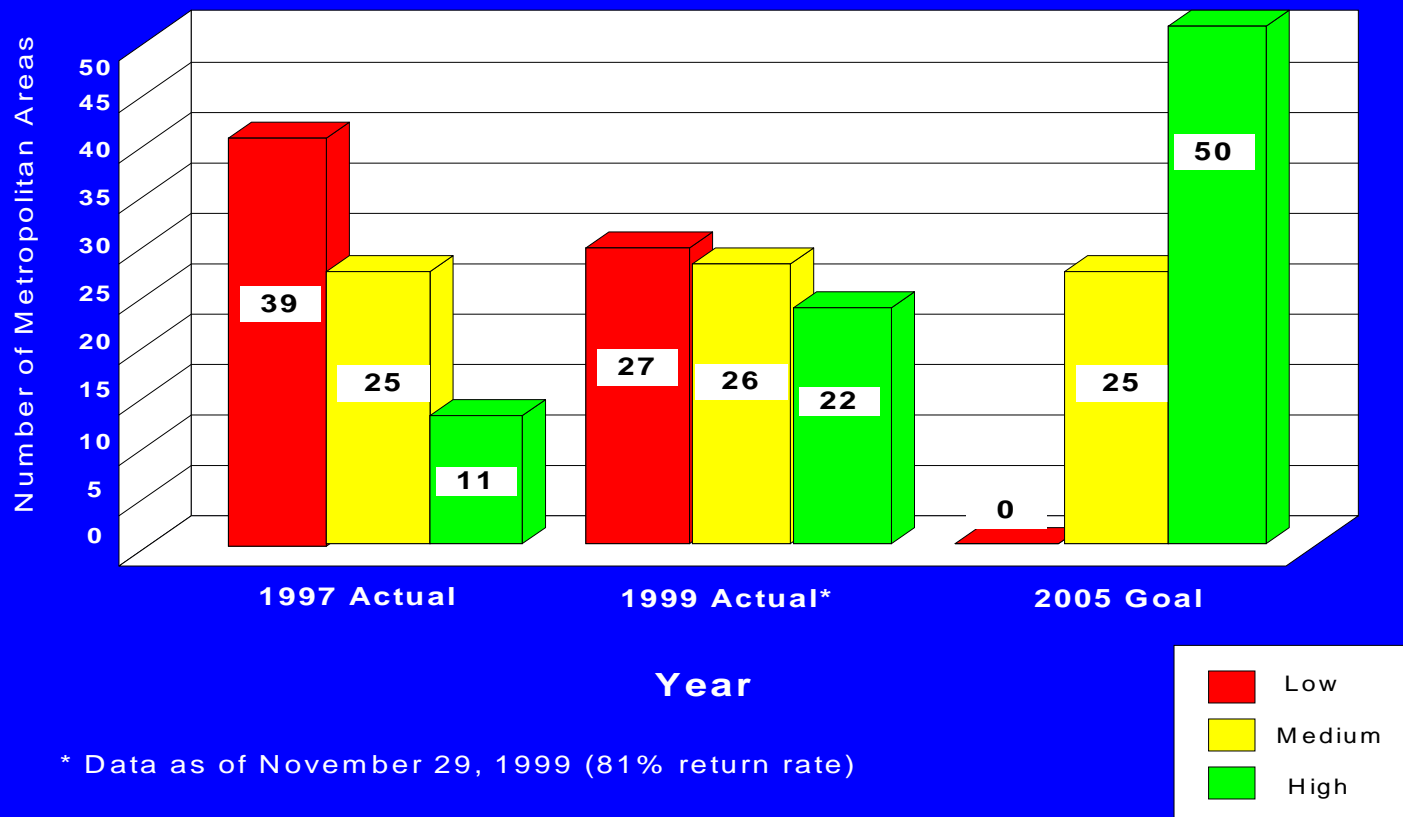


*Railroad
Grade
Crossing*

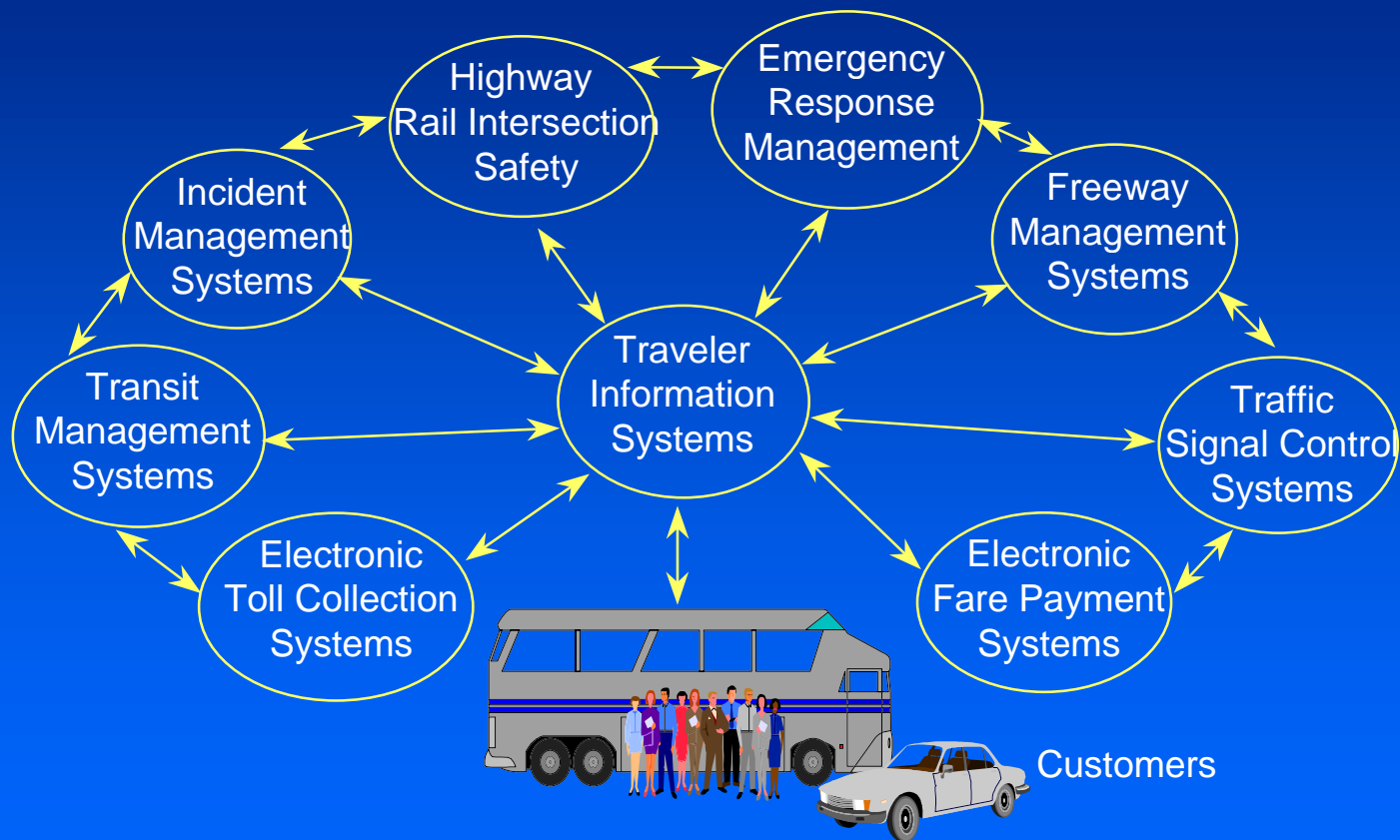


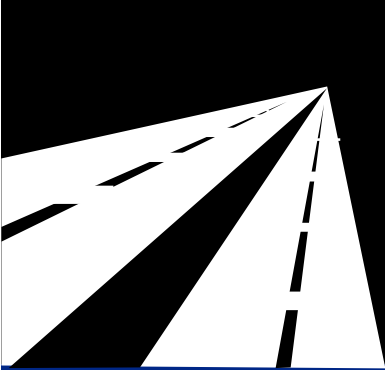
*Electronic
Payment*

Progress in Integrated Metropolitan ITS Deployment

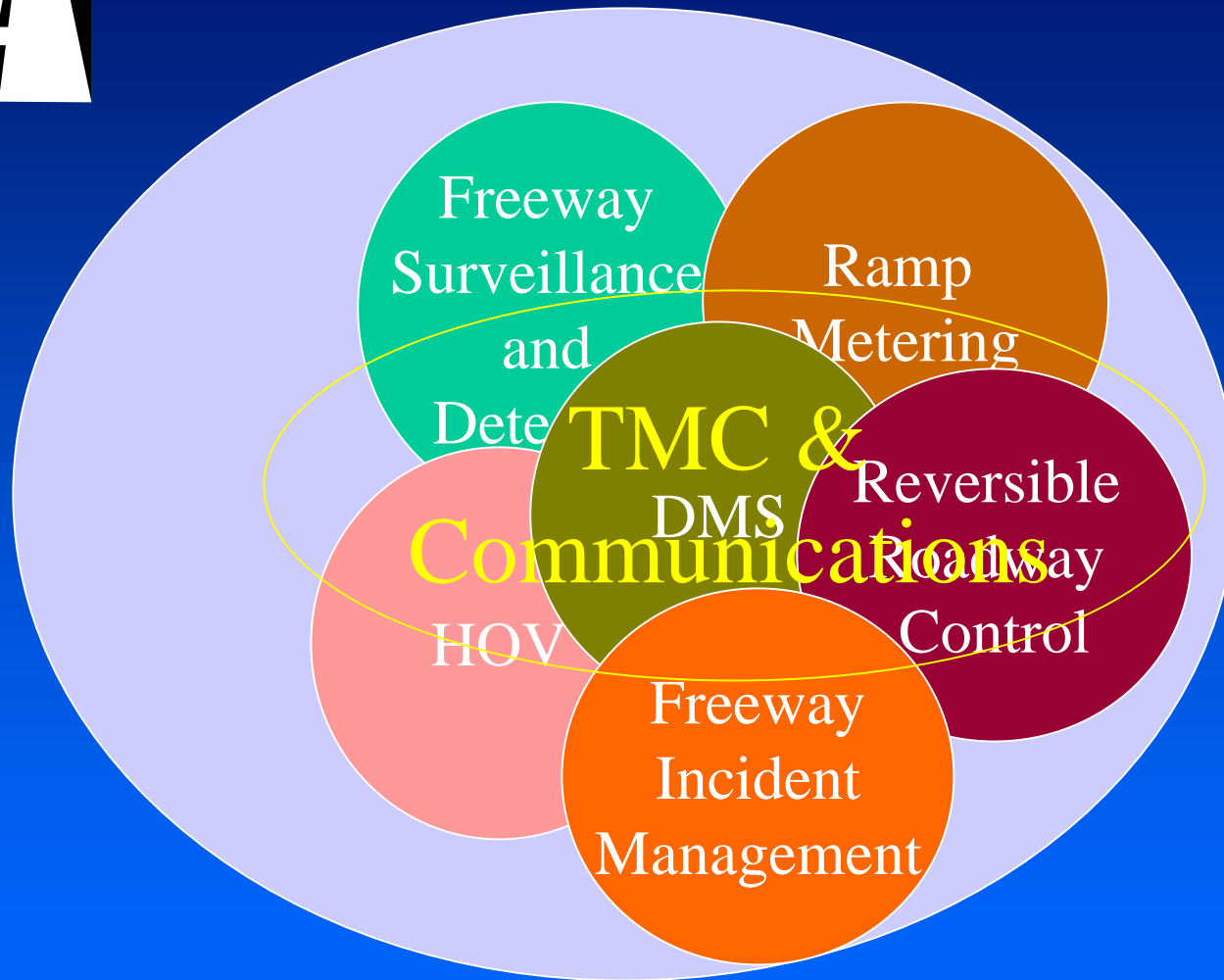


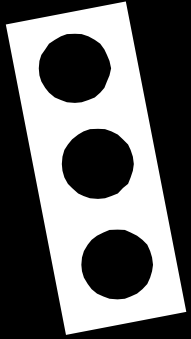
Integration is Key



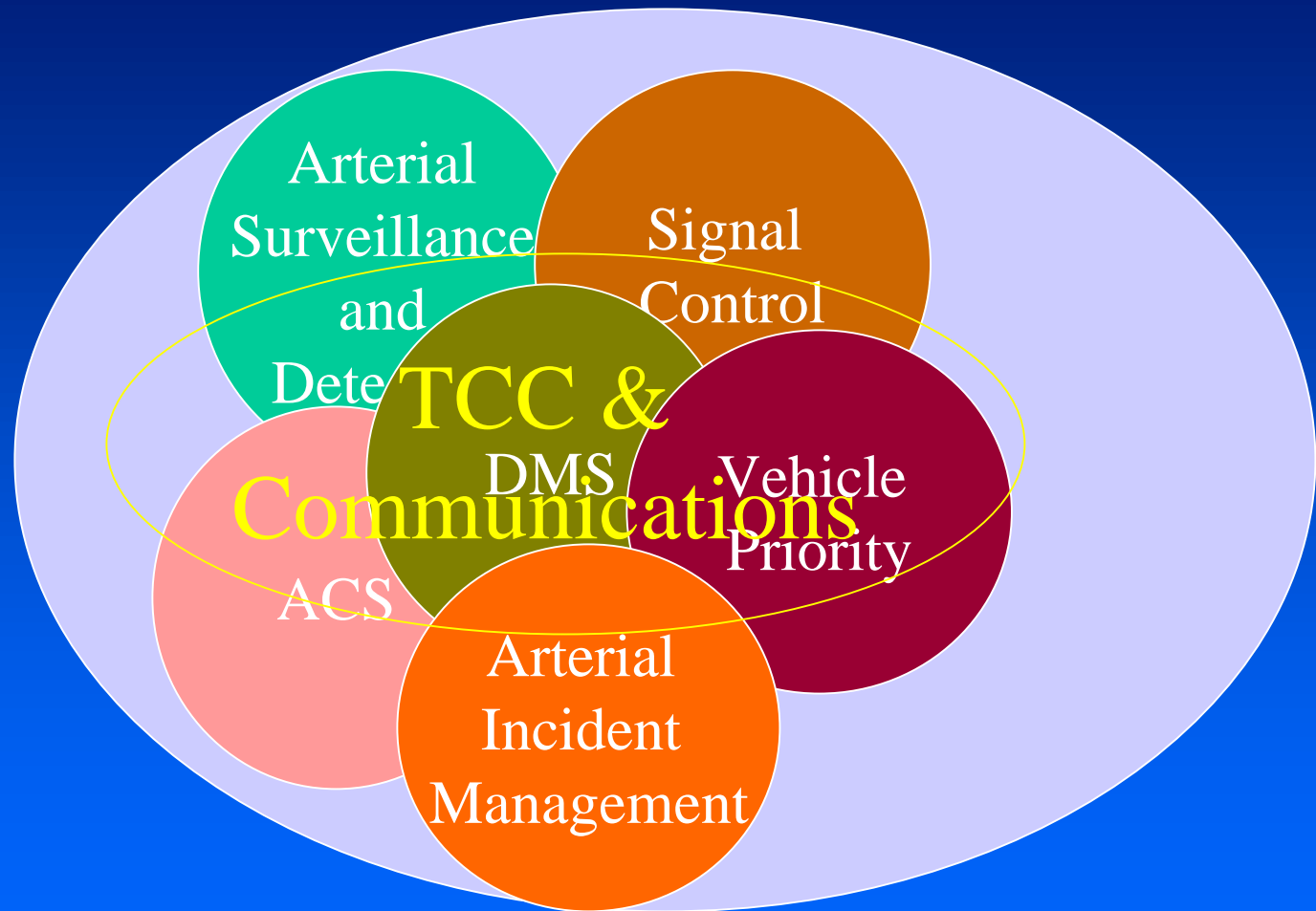


Freeway Management Systems

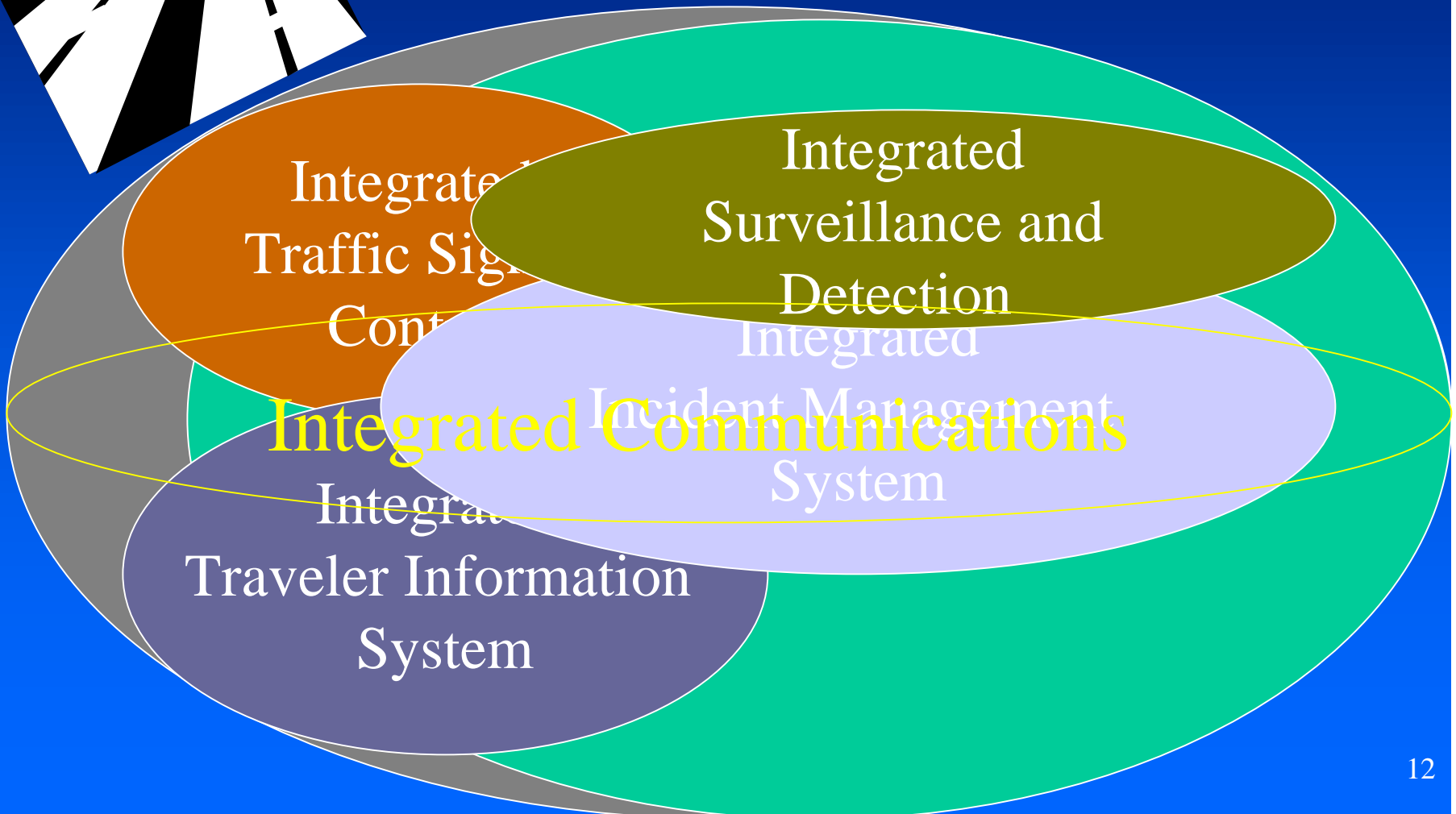




Arterial Management Systems



Integrated Freeway & Arterial Systems



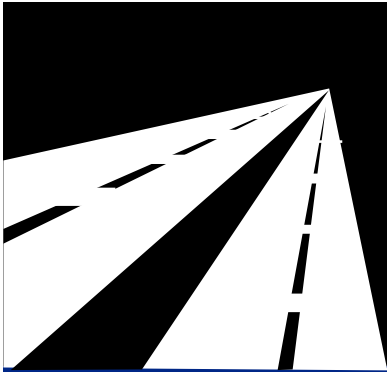
Synergism of a System

1 + 1 = 3 or More

A System is **greater than the Sum** of its parts

Due to the **Relationships** between System elements that create the **Added Value**

The higher the **Coupling between** System elements, the higher the Synergism

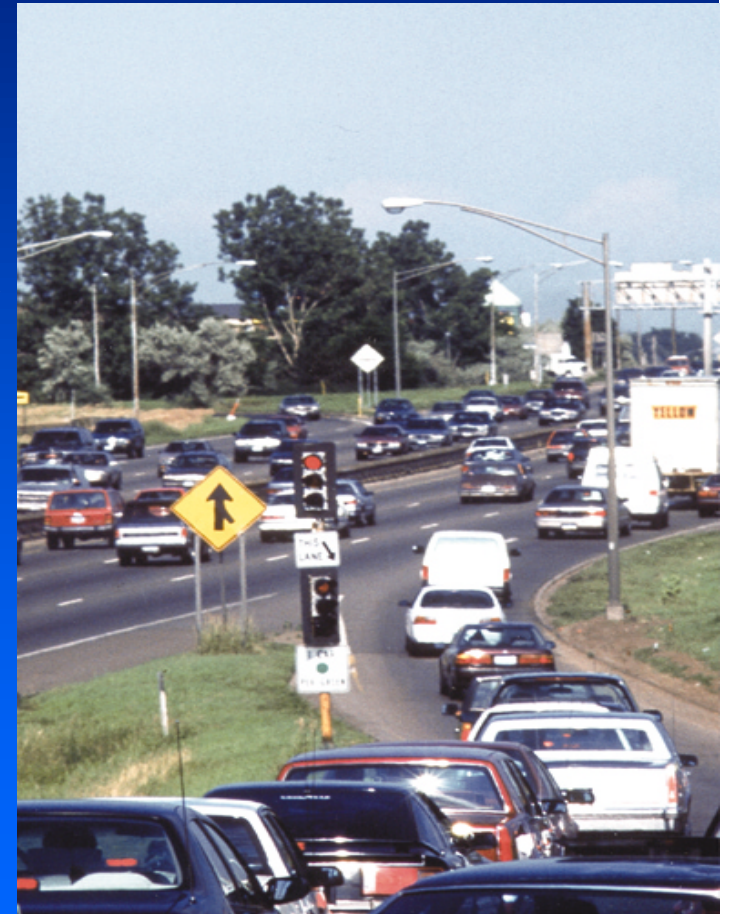


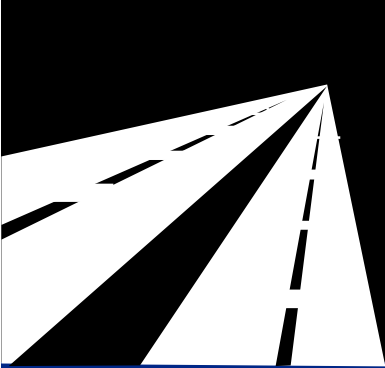
Freeway Management Systems

Freeway Management Systems are used to manage travel, control traffic and monitor roadway conditions by:

- Monitoring traffic & roadway conditions and assessing performance
- Identifying recurring and non-recurring flow impediments
- Implementing various management and control strategies to smooth the flow of traffic (e.g., ramp metering, HOV, traffic diversion)
- Providing critical information to travelers through DMS, HAR, etc.

Lead to Reduction in Fuel Use and Emissions



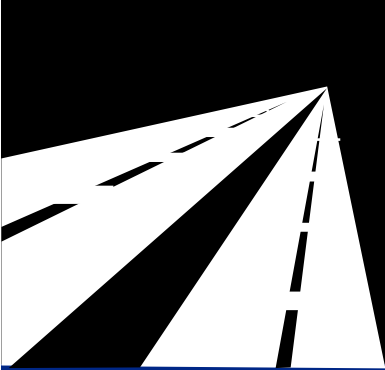


Freeway Management Systems

St-Paul MN

When Meters were turned off:

- 14% decline in throughput during peak traffic conditions
- 22% increase in travel times
- 91% decrease in travel time reliability
- 14% decrease in travel speeds
- 26% increase in crashes
- Increased emissions (1,160 tons annually)



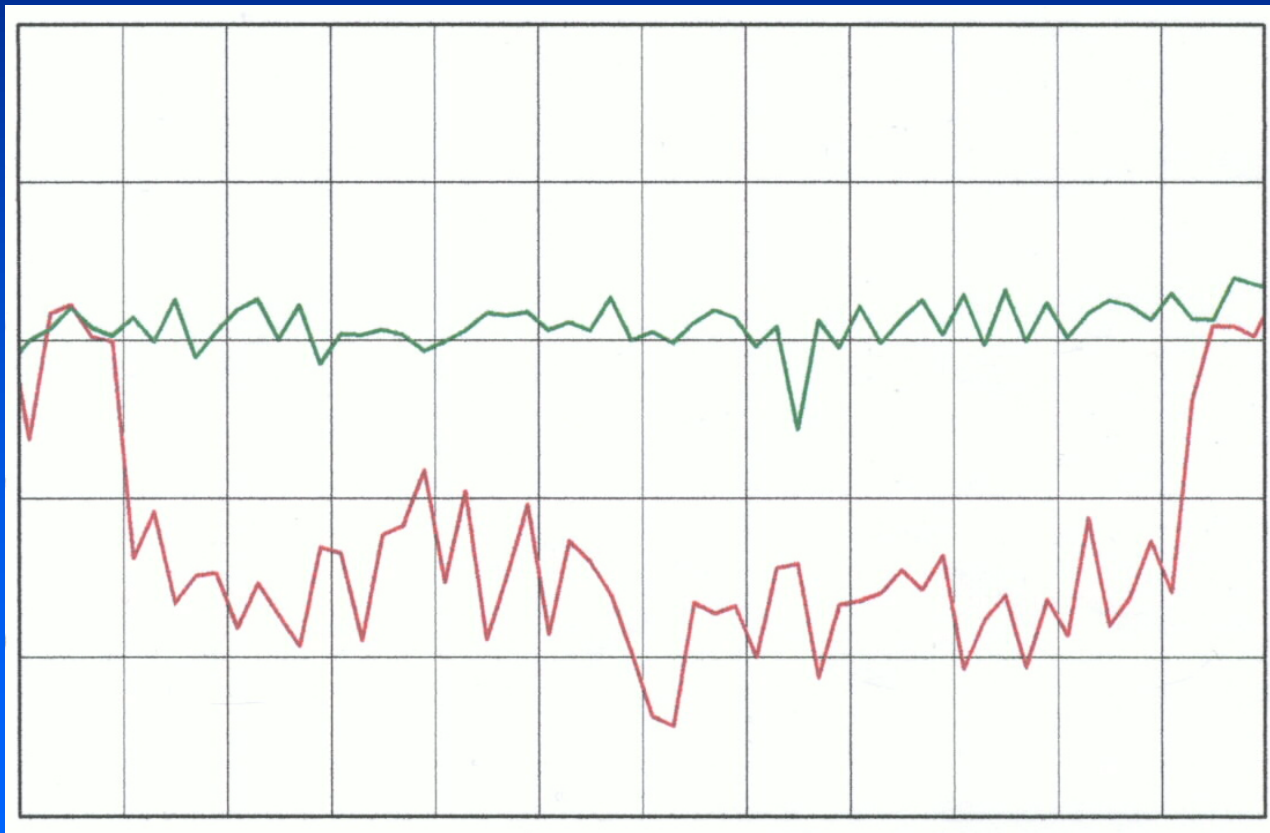
Increased Speed Variability

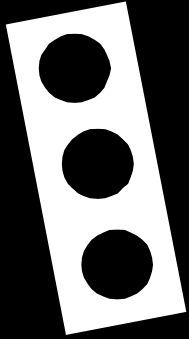
Detector: 3136 - 94/25AvE3 Time (Hour of Day)

:15 :30 :45 16 :15 :30 :45 17 :15 :30 :45 18

Speed (Miles per Hour)

80
60
40
20



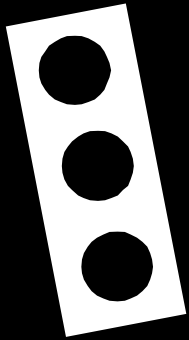


Arterial Management Systems



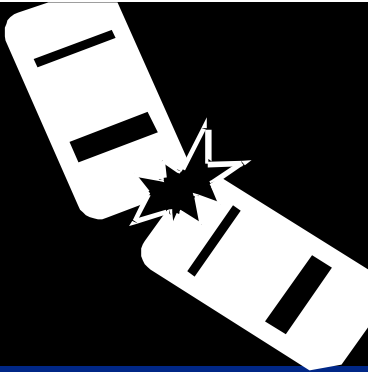
- Arterial Management Systems are used to manage traffic and control arterial roadways by:
 - Deploying signal systems that react to changing traffic conditions
 - Coordinating traffic signals to improve traffic flow and increase throughput
 - Collecting and processing real-time information
 - Providing emergency and transit vehicle priority

Lead to Reduction in Fuel Use and Emissions



Arterial Management Systems

- System in Phoenix, Paris, Toronto, Los Angeles indicate a reduction in fuel use between 2% and 13%
- The Fairfax, Prince William and Loudon county signalized control (700 signals), when optimized showed a 6% reduction in stops, a 22% reduction in system delay, a 9% reduction in fuel consumption, and annual emissions for CO, Nox and VOC reduced by 134,000 kg.
- The Toronto SCOOT (75 signals) found an 8% decrease in travel time, 22% decrease in stops, 17% decrease in delay, 5.7% decrease in fuel consumption, 3.7% decrease in HC and 5% decrease in CO
- Los Angeles (1,170 signals)
 - 41% reduction in stops
 - 18% reduction in travel time
 - 44% reduction in delay
 - 14% reduction in emissions
 - 13% reduction in fuel use
- Richmond CBD (262 signals)
 - > Travel Time – (9% - 14%)
 - > Delay – (14% - 30%)
 - > Stops – (28% - 39%)
 - > Fuel use – (10% - 12%)
 - > Emissions – (5% - 22%)

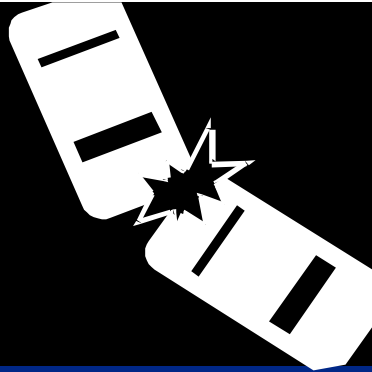


Incident Management Programs

- Programs to quickly identify and respond to incidents that occur on freeways and major arterials
 - Coordinate incident management across jurisdictional boundaries
 - Improve response time
 - Reduce traveler delay and safety

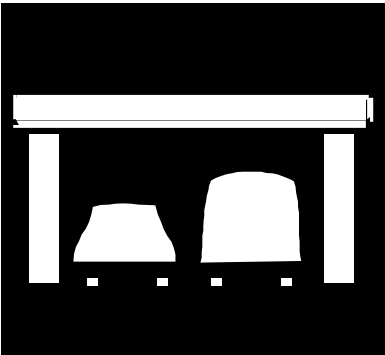


Lead to Reduction in Fuel Use and Emissions



Incident Management Programs

- Nationally incidents account for 60% of traffic delays
- San Antonio Transguide – 2600 gallons of fuel saved during a major incident
- The Maryland CHART, in 1997, saved:
 - 15,6 million vehicle hours of delay
 - 5.85 million gallons of fuel
- San Francisco Freeway Service Patrol saves:
 - 32kg/day of HC
 - 322kg/day of CO
 - 798kg/day of Nox



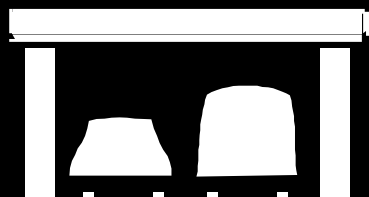
Electronic Toll Collection

Roadside and in-vehicle technology that allows vehicles to pay electronically and go through toll plazas without stopping

- Reduces delays at toll-collection plazas
- Reduces stops
- Increases throughput
- Reduces costs

**Lead to Reduction in Fuel Use
and Emissions**





Electronic Toll Collection

Orlando, Florida ETC

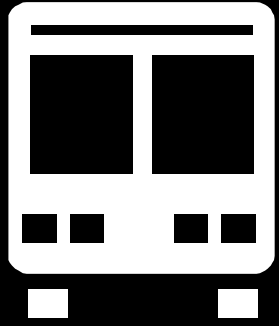
- 30% increase in No. of vehicles
 - CO reduced by 7.29%
 - HC reduced by 7.19%

Oklahoma Pike ETC

- > 72% reduction for CO
- > 83% reduction for HC
- > 45% reduction for Nox

Tappan Zee Bridge

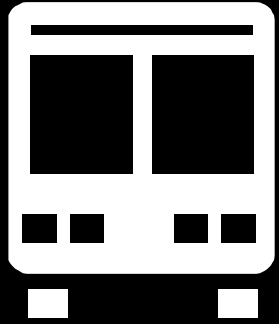
- Throughput increase 122%



Transit Management Systems



- Transit Management Systems help to:
 - Provide safety and security to passengers by allowing remote monitoring
 - Provide real-time information to travelers
 - Assist operators in maintaining fleets of vehicles
 - Improve and maintain scheduling activities by using AVL
 - Optimize travel times



Transit Management Systems

Kansas City Area

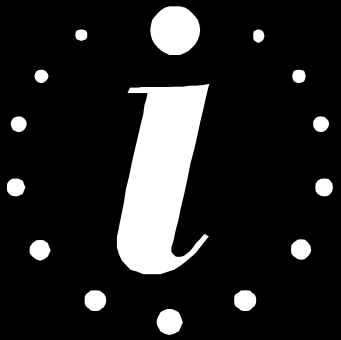
- 12% improved on-time performance using AVL

Milwaukee

- 28% decrease in the number of buses more than one minute behind

Baltimore

- 23% improved on-time performance using AVL-equipped buses

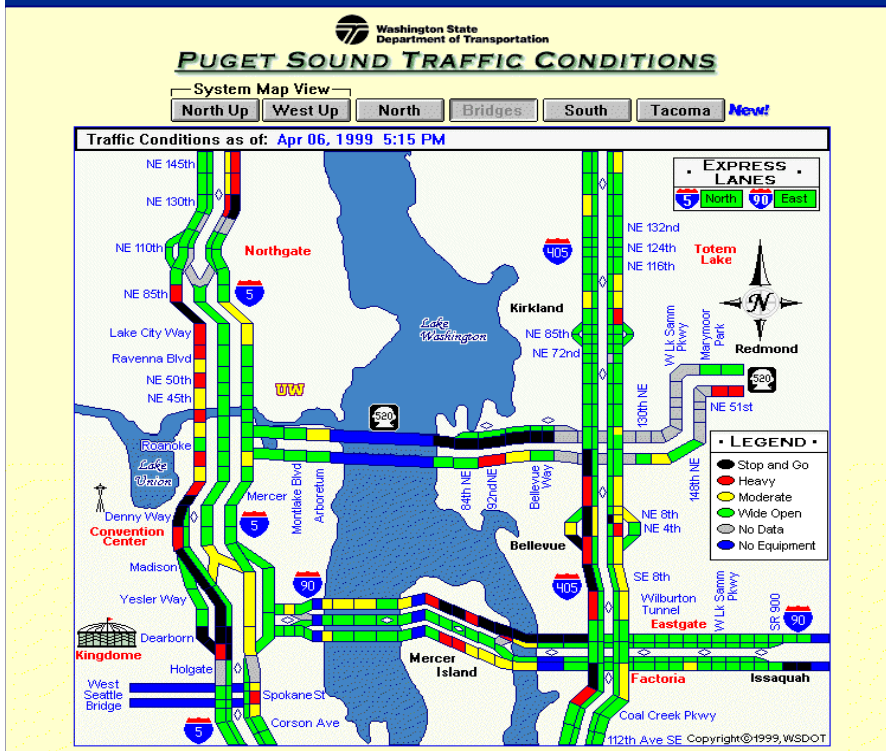


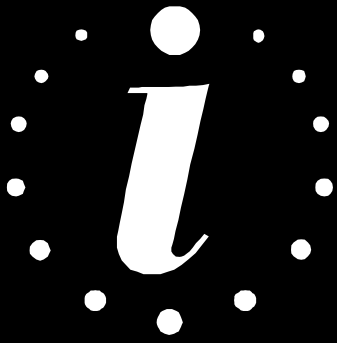
Traveler Information Systems

Traveler Information Systems provide timely, real-time travel information enabling the traveler to make informed transportation choices

- Promote regional coordination in collecting, processing and presenting information
- Reduce congestion
- Increase transit use

Lead to Reduction in Fuel Use and Emissions





Traveler Information Systems

San Antonio Transguide

- Travelers that use web site for traffic information
 - 5.4% reduction in delay
 - 0.5% reduction in crash rate
 - 1.8% reduction in fuel consumption
- Travelers using IVN devices
 - 8.1% reduction in delay
 - 4.5% reduction in crash rate
 - 3% reduction in fuel consumption

Pre-trip ATIS services reduce delay, crash risk and fuel consumption

Seattle and Boston

- Provided with better traveler information, 50% change route, 45% change time of travel
 - 498kg/day reduction of VOC (25%)
 - 25kg/day reduction of Nox (1.5%)
 - 5032kg/day reduction of CO (33%)

For more information contact

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Additional ITS Web Resources

- ITS Joint Program Office:
 - <http://www.its.dot.gov>
- ITS Electronic Document Library (EDL):
 - <http://its.fhwa.dot.gov/cyberdocs/welcome.htm>
- ITS Cooperative Deployment Network (ICDN):
 - <http://www.nawgits.com/jpo/>
- ITS America
 - <http://www.itsa.org/>