Brent O. Bair

Mr. Bair obtained both a Bachelor of Arts degree and a Master of Sciences degree in engineering from the University of Iowa. He went on to complete course work and comprehensive exams toward a Ph.D. in Civil Engineering. While working on his degrees, he worked part-time consulting on transportation planning and on highway accident investigation and reconstruction.

Mr. Bair joined the Road Commission for Oakland County (RCOC) in 1977 to fill the position of Transportation Planning Coordinator. In 1983, he became director of the Planning & Development Department, and in 1988, he was promoted to Deputy Managing Director. In 1993, he was appointed Managing Director.

One of Mr. Bair's responsibilities is *FAST-TRAC*; RCOC's ITS deployment project. Oakland County's FAST-TRAC system is the nation's largest adaptive signal system, as well as the largest deployment of video imaging for vehicle detection in the world. Bair also initiated the Southeast Michigan Snow and Ice Management (SEMSIM) ITS project, involving deployment of ITS equipment on 500 winter maintenance vehicles operated by the four largest local road agencies in Michigan. RCOC is currently entering into demonstration projects with auto companies to provide for communication and exchange of information between vehicles and infrastructure as part of the Vehicle Infrastructure Integration (VII) initiative.

Mr. Bair is one of the founders of ITS-Michigan, the Michigan chapter of ITS AMERICA. He is a past president of ITS Michigan and is currently on the board of directors. He is past chairman of the board of directors of ITS America. Mr. Bair served as the chairman of the ITS Caucus Advisory Committee for reauthorization of the federal transportation program (SAFETEA-LU), and is currently the chairman of the ITS Caucus Public Sector Advisory Committee, advising the congressional ITS Caucus on ITS issues. He is also a past president of the County Road Association of Michigan and is currently on the board of directors of that association.

April 18, 2007

Testimony before the National Surface Transportation Policy & Revenue Commission Field Hearing University of Minnesota Twin Cities Campus Minneapolis, Minnesota

Presented by
Brent O. Bair
Chairman
Public Sector Advisory Committee
Intelligent Transportation Systems (ITS) Caucus of the United States House of Representatives

The following report was presented on behalf of the Public Sector Advisory Committee (PSAC) to the Intelligent Transportation Systems (ITS) Caucus of the United States House of Representatives on April 18, 2007. This committee is made up of leaders of state and local transportation agencies across the country. A list of the committee members is attached. The report was presented by Brent O. Bair, chairman of the PSAC and managing director of the Road Commission for Oakland County, Michigan.

General Position on ITS

The committee believes strongly that future transportation funding should be tied to safety enhancements and congestion relief. It also believes that ITS technologies provide some of the most effective tools to enhance safety and manage congestion.

To that end, the committee has adopted a number of preliminary recommendations related to reauthorization, which we would encourage you to take into consideration. They are:

1. As was recommended by the Congressional ITS Caucus Advisory Committee prior to the enactment of SAFETEA-LU, the committee proposes that a categorical program be established that would provide ITS funding to every state, based on a funding formula. States would then be required to use the money to expand ITS deployment or they would lose the money. We believe this is the best way to encourage the expansion of ITS deployment across the nation, and to ensure that ITS is not concentrated only in a select few states and metropolitan areas.

2. The US DOT should collect and enthusiastically promote data documenting the benefits of ITS technologies, such as "before and after" studies. Additionally, US DOT should continue to guide and encourage research into enhancing ITS, including cost/benefit analyses, peer-to-peer technical assistance, training courses, and continued refinement of the national ITS standards and architecture.

   Other research that should be encouraged includes: ways to improve corridor management; harnessing advances in wireless communications to support better transportation system management; furthering "intelligent vehicle" safety technology; and maximizing the effectiveness of traffic data collection; among many other areas. This is needed to help overcome the long-standing bias toward using available funding solely for traditional asphalt and concrete rather than for technologies that are perceived by some as "unproven."

3. Remove the current three-year time limit on the use of CMAQ funds for ITS operations, as was accomplished for Michigan in SAFETEA-LU. One of the big concerns of many state and local transportation agencies is that, even if funds are available to deploy ITS technologies, there will be no funding available for the ongoing maintenance of these tools. Making CMAQ dollars available for this purpose indefinitely would help to minimize this concern.

4. As was proposed in SAFETEA-LU, but not yet accomplished, revise the procurement processes tied to federal funding to better accommodate the needs of ITS. Current requirements were established primarily for the purchase of traditional road construction processes (asphalt and concrete) rather than for cutting-edge technologies.

In addition to these specific recommendations, the Committee also believes there are some general, overarching principles that should guide discussions of transportation and transportation-technology funding. These include the conviction that the federal government must continue to play the vital role of catalyst for the advancement and increased deployment of transportation technology. The federal government has the unique perspective of being able to see the big picture much more clearly than those of us focused on day-to-day field operations. For us too often the operational objectives are simply to maintain the status quo or maybe add a minimal number of new programs. This situation often does not allow many local road agencies the luxury of considering or investing scarce resources in new technologies that might improve operational efficiency or enhance the safety of our systems.

Leaders at the federal level, however, can take steps that will spur those of us in field operations to step back long enough to engage these new technologies. National leaders have the opportunity to present the vision of what the system *should* look like and develop programmatic incentives to move the nation's transportation agencies toward that vision. There is a tremendous opportunity, at this point in time, to provide this bold leadership through the reauthorization process. The PSAC implores our national transportation leaders not to squander this opportunity by simply continuing with "more of the same."

Two examples of areas where technology can make major contributions are congestion relief and safety enhancements. The federal government can stimulate advances in these two areas simply by tying some funding to programs that promote these goals. Without such incentives, many of us at the local level are apt to succumb to the immense pressure to invest solely in new pavement that is a more visible "improvement" to which local politicians can point. While such improvements will always be a necessary part of the mix for local road agencies, devoting all road improvement dollars to these "status quo" projects is penny wise and pound foolish, and too often does not generate the significant congestion reductions and safety enhancements that technology promises.

An Early Success Story

Consider the results one agency has achieved in improving motorist safety and reducing congestion through the deployment of ITS technology. At the Road Commission for Oakland County, Michigan, back in the late 1980s administrators came to the realization that the county, located just northwest of Detroit and with a population of approximately 1.1 million, was likely to continue to grow at a rapid rate and that it was unlikely the Road Commission would ever have enough money to widen all the roads that would need to be widened. Consequently, the Road Commission began looking for other alternatives that would allow it to more cost effectively increase the capacity of its existing road system. This search led to technology.

Specifically, the Road Commission looked to adaptive traffic signals. That led to the introduction in 1992 of the agency's first adaptive signals which the Road Commission refers to as its FAST-TRAC system, or Faster and Safer Travel through Traffic Routing & Advanced Controls. Agency administrators found that Sydney Australia at the time had one of the most advanced adaptive signal systems in the world, and they emulated Sydney's system. However, there is one major difference between Southeast Michigan and Sydney, Australia – their climates. Oakland County does not have the balmy subtropical weather found in Sydney. What does this have to do with adaptive traffic signals? As it turns out, quite a bit. In Sydney, they were able to rely on inductive loops in the pavement to provide the critical vehicle detection that is required for adaptive signals. In Southeast Michigan, the Road Commission had used loops on a limited basis, and was well aware of their shortcomings in the Michigan climate – if the loops malfunction in winter they cannot be repaired until spring because the sealants used to cover the loops do not adhere in the winter.

The agency had to find another means of detecting vehicles that would be reliable year-round in Michigan's climate. It turned to video vehicle detection, which, at the time, was little more than a university research project. However, thanks to incentives provided by the Federal Highway Administration, the Road Commission tried this new technology. After working through some initial difficulties, it found video imaging to be quite reliable. Today, video-imaging vehicle detection is used around the world, although the Road Commission for Oakland County still has the largest deployment with more than 2,000 cameras in the air. These cameras provide vehicle detection for the Road Commission's FAST-TRAC adaptive signals at more than 650 intersections, making FAST-TRAC the largest adaptive signal system in North America and the largest deployment of video imaging vehicle detection for traffic management in the world.

But the size of the system in itself is not nearly as important as what the system is accomplishing. The Road Commission was fortunate enough to obtain special federal funds to pay for much of the system. Those funds, however, came with the requirement that the agency hire an objective third party to conduct before and after studies to document whether or not the system was actually achieving the goals of reducing congestion and improving safety. The Road Commission hired the University of Michigan and Michigan State University to conduct these studies – and it wasn't disappointed.

One of the studies documented a more than 50 percent reduction in serious injury-accidents in the city of Troy, the first community that was fully outfitted with FAST-TRAC. Another study documented peak travel time reductions on one of the county's busiest corridors of between 7 and 32 percent. Intersection delays were also shown to be reduced by 26 percent in non-peak times and 17 percent during the evening rush hour at one of the busiest intersections along this corridor. I n a third study, "stopped vehicle delays" were found to be reduced by 20 percent at a busy intersection in the city of South Lyon following the installation of FAST-TRAC. Clearly, this system of adaptive traffic signals, utilizing video-imaging vehicle detection, is accomplishing the duel goals of expanding the capacity of the existing road system while also making those roads safer.

The implementation of this system has not been inexpensive. However, the technology deployment was far less expensive than it would have cost to physically widen the roads to accomplish these same benefits. In other words, this is a clear example how technology can cost-effectively enhance the nation's transportation system. A list of other ITS deployment success stories from other parts of the country is attached to this report.

<u>The Future</u>

While the proven benefits of ITS deployments such as FAST-TRAC are exciting, an evolving segment of ITS being referred to as Vehicle-Infrastructure Integration (VII) holds even greater potential. Currently, these new technologies are being tested nationally and extensively in Oakland County – the national "Proof of Concept" sites. These technologies include the potential for the vehicles and the infrastructure to communicate directly for the first time.

“Smart” traffic signal systems such as our FAST-TRAC system collect a wealth of real-time traffic congestion information that could be of great value to motorists. Vehicles coming off the assembly line today are packed with hundreds of sensors that are continuously collecting data, some of which could be very valuable to those of us in the road business. For example, if road agencies could learn in real time the exact locations where numerous vehicles are applying their anti-lock brakes, they may be able to quickly correct a road safety problem that they might otherwise have been unaware of. Or, if temperatures are right at the freezing point and precipitation is forecast, the combination of vehicle temperature sensors and the windshield wiper sensors could provide data to road agencies in real time from thousands of cars simultaneously to quickly help them determine where they need to deploy salt trucks, ensuring ice prevention in the most timely manner possible.

Another benefit of this type of real-time automated communication is the potential for vehicles to automatically warn each other of problems. For example, as a vehicle approaches an accident on a freeway and is forced to quickly decelerate, the vehicle could automatically send warnings to approaching vehicles letting them know that traffic is abruptly stopping ahead. Or, if a vehicle hits an icy patch of road and fish-tails slightly, the vehicle’s stability sensors could shoot an instant warning by linking to an exact GPS-identified location to on-coming cars that there is an icy patch. Those cars would then provide a location-specific warning to their drivers that they are approaching the dangerous area.

We are on the cusp of realizing the benefits of this vehicle-to-infrastructure and vehicle-to-vehicle communications revolution. In fact, national “proof of concept” tests, authorized by the Federal Highway Administration, will take place this year in a few select locations around the country, including in Michigan and California.

This is particularly exciting because this technology offers perhaps the greatest opportunity to proactively improve motorist safety that we have ever seen. This goes far beyond the traditional “passive” safety improvements of the past, such as anti-lock brakes or airbags. Unlike these passive technologies which try to minimize damage once an event occurs, these new “active” technologies would actually prevent the event from occurring in the first place.

Again, the Public Sector Advisory Committee feels strongly that the federal government should strenuously push the development and deployment of these technologies in order to address national safety and congestion problems. The government can best do this through financial incentives by ensuring that a portion of federal transportation dollars are set aside solely for use on transportation technology.

Public Sector Advisory Committee to the US House of Representatives ITS Caucus

Representation

- **State Departments of Transportation:**
  - **Doug Differt** Deputy Commissioner/Chief Engineer – Minnesota DOT
  - **Randy Iwasaki** Chief Deputy Director – CALTRANS
  - **Kirk Steudle** Director – Michigan DOT

- **Metropolitan Planning Organizations:**
  - **Ann Flemer** Deputy Director, Operations – Metropolitan Transportation Commission, San Francisco Bay Area, California
  - **Carmine Palombo** Transportation Program Manager – Southeast Michigan Council of Governments

- **Counties:**
  - **Brent Bair** Managing Director – Road Commission for Oakland County, Michigan
  - **Tom Zlotkowski** Director – Sacramento County DOT, California

- **Cities:**
  - **Jason E. Cosby, P.E.** Assistant Director of Public Works – City of San Antonio, Texas
  - **Charles Ramdatt, P.E.** Manager, Transportation Engineering Division – City of Orlando, Florida

- **Academia:**
  - **Hamed Benouar, PhD.** Director – California Center for Innovative Transportation, UC Berkeley
  - **Chip White, PhD.** Schneider National Chair of Transportation and Logistics – Georgia Institute of Technology, Atlanta, Georgia

- **Transit Authorities:**
  - **Greg Cook** CEO and Executive Director – Ann Arbor Transportation Authority, Michigan
  - **John Inglish** General Manager/CEO – Utah Transit Authority

- **Public Turnpikes/Toll Roads:**
  - **Christopher Warren** Deputy ED/COO – Florida’s Turnpike Enterprise

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
FAST-TRAC	Oakland County, Michigan	The intent of these studies was to determine the impacts of the Sydney Coordinated Adaptive Traffic System (SCATS) on traffic accidents, travel times, and delays in Oakland County	The percent of accidents that resulted in serious injury decreased 50% after FAST-TRAC installation. The travel time improvements in AM Peak was 20% NB, 9% SB, Off-Peak was 32% NB, 15% SB, PM Peak was 7% NB, 7% SB. Intersection delay had a reduction of 26% Off Peak and 17% PM Peak
Automated Traffic Surveillance and Control Program (ATSAC)	Los Angeles, California	Signal timing optimization of 1,170 intersections and 4509 detectors	Decreased fuel consumption 13%, decreased air emissions 14%, reduced vehicle stops 41%, reduced travel time 18%, increased average speed 16%, and decreased delay by 44%
Advanced Signal System	Richmond Virginia	An advanced signal system was installed at 262 signalized intersections in the Central Business District (CBD)	Travel times decreased 9-14%, total delays decreased 14-30%, stops decreased 28-39%, fuel consumption decreased 10-12%, and emissions decreased 5-22%. An annual savings of 326,020 vehicle hours of delay, 495,530 vehicle hours of total travel time, approximately 76 million stops, and nearly 2.9 million liters of fuel resulted in an annual cost savings of approximately $4.2 million dollars
ITS Impacts Assessment For Advanced Traffic Management Systems (ATMS)	Seattle, Washington	The ATMS study captured impacts of re-timed signals along 2 major arterials in the north corridor of Seattle	The total AM peak period delay in the north corridor was reduced by 7% with an average of 0.2% more vehicles entering and leaving the network during peak periods. Travel time variation decreased by 2.1%. The number of crashes decreased by 2.5%. Travel speed increased from 32-40 kph to 60-80 kph
Phoenix Metropolitan Model Deployment Initiative also known as AZTech	Tempe, and Scottsdale, Arizona	This study evaluated the impact of traffic signal coordination among 2 jurisdictions in the same arterial corridor. The corridor was 5.7 miles of rural road in Scottsdale and Tempe consisting of 21 signals	There was a 6.2% increase in vehicle speeds, 1.6% reduction in fuel consumption, and a 6.7% reduction in the crash risk along the mainline

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
Collision Countermeasure System (CCS)	Aden, Virginia	A (CCS) was installed at a rural, unsignalized, two-way, stop-controlled intersection to improve safety. The system automatically activates signs that advise drivers of the presence and direction of approaching traffic	Lower approach speeds and safer Projected-Times-to-Collision (PTCs) were observed. The average speed was reduced from 49.7 mph to 47.3 mph and the average PTC increased from 2.54 to 3.5 seconds
Downhill Speed Warning System	Denver, Colorado	A downhill speed warning system was deployed on a mountainous highway. The system was designed to reduce vehicle speeds as trucks emerged from the I-70 Eisenhower Tunnel and approached a 10 mile section of downhill grades (5-7%)	The average speed of passing trucks decreased by 5.2 mph
Infrared Brake Screening Inspection System (IRISystem)	Georgia, Kentucky, North Carolina, Tennessee	Commercial Motor Vehicles (CMVs) were monitored for brake problems. Infrared cameras monitored traffic entering and passing weigh stations. The cameras detected temperature variations in brake components	Approximately 10% of wheels screened by the IRISystem were cold, 1% of the wheels screened by the IRISystem were excessively hot, 59% of vehicles identified were placed out of service after a brake inspection. 80% of these vehicles had brake problems
Vehicle Speed Warning System	Sioux Falls, South Dakota	The study evaluated the effectiveness of a vehicle speed warning system to reduce traffic speeds approaching a bridge-replacement work zone on W.B. I-90	The number of 2 axle vehicles exceeding the speed limit by more than 10 mi/hr decreased by 20-25%. The number of vehicles with more than 2 axles traveling at excessive speeds dropped by 40%

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
Ramp Rollover Warning System (RRWS)	Washington, District of Columbia	RRWS was deployed on 2 major interchanges & one exit ramp on the Capital Beltway. The system was designed to alert truck drivers to slow down when safe speeds were exceeded	There have been no reported rollover accidents. Trucks that activated the warning sign had an average speed reduction of 8.3 mph as they approached the ramps
Automated Work Zone Information System (AWIS)	Los Angeles, California	Tube counters were placed on 6 entry and exit ramps (Magic Mountain area) to measure traffic counts, 2 probe vehicles were used to collect travel time data on the mainline and alternate routes	The average mainline delay was reduced by 46.2% and the total mainline delay was reduced by 40.7%. Mainline travel time was reduced from 21.8 minutes to 13.5 minutes, which was equivalent to a 38.1% reduction
Work Zone Incident Management System	Albuquerque, New Mexico	A construction traffic management center (CTMC) was developed to monitor work zone traffic conditions, assess incidents, dispatch police, wreckers, and on-site courtesy patrols during the reconstruction of the "Big I" interchange.	The average clearance time on the "Big I" was 20 minutes faster, and the average response time was under 8 minutes, no fatalities were reported
Adverse Visibility Information System Evaluation (ADVISE)	Salt lake City, Utah	In-pavement loop detectors were used to monitor vehicle speed and classification by lane, direction, and time of day during foggy, and clear conditions	When travel speeds were provided, the number of excessively slow drivers decreased. The average speed between vehicles decreased by 22%
Fog Detention and Warning System	Southeastern Tennessee	A fog detection & warning system on I-75, Chattanooga to Knoxville. DMS messages were pre-recorded consisting of appropriate speeds, road closures & detours	Safety has been significantly improved as no fog-related accidents have occurred

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
Wisconsin Winter Weather System (WWWS)	Wisconsin	The WWWS aids in the dispatch of snow plows and deicers during winter storms, the system helps determine when and where to dispatch equipment for snow and ice removal	The results indicate a savings of up to 4 hours per person for each significant storm or $144,000/storm. The system is estimated to save approximately $75,000 in reduced salt usage for a single storm. If used statewide for 15 storms (about 50% of the total number of storms in a season) the savings would be 37,500 tons of salt or $1,125,000 for a season
Information For Motorists (INFORM) System	Long Island, New York	The study shows the benefits of ramp metering in combination with motorist information	The results showed that freeway speeds increased 13% despite an increase of 5% in Vehicle Miles Traveled (VMT) for the PM peak. The number of detectors showing speeds of less than 30 mph decreased 50% for the AM peak. Average queue lengths at ramp meters ranged from 1.2 to 3.4 vehicles, representing 0.1% of vehicle hours traveled
Metro Area Ramp Meter Study	Minneapolis/St Paul, Minnesota	The study began with a 5 week pre-study data collection to compare against the data collected when the ramp meters would be turned off. The study explored the impacts of ramp metering on freeways, local roads, and on transit operations.	**Without** ramp meters there was: A 9% reduction in freeway volume; a 22% increase in freeway travel times; a 7% reduction in freeway speeds. The reliability of freeway travel time was found to decline by 91%; a 26% increase in crashes, which broke down to a 14.6% increase in rear-end crashes; a 200% increase in side-swipe crashes; a 60% increase in "run off the road" crashes; and an 8.6% increase in other types of crashes
Freeway Courtesy Patrol (FCP)	Southeast Michigan	The 24-hour per day, 365-day per year courtesy patrol covers most of the freeway system in Macomb, Oakland and Wayne Counties. The purpose of the patrol is to assist motorists and clear shoulders and lanes of obstructions in a timely fashion	9.2 million hours of delay were saved. The following air quality benefits were realized: VOC:1,683 kg/day, NOx: 803 kg/day, CO: 12,390 kg/day. Based on the amount of delay saved, there was a $15 benefit for every $1 spent on the program

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
Florida's Turnpike ITS/Incident Management Integration	Florida	Florida's Turnpike Enterprise (FTE) system detects incidents that impact traffic conditions and customer safety via CCTV cameras for the purpose of dispatching appropriate resources for public safety and highway clearance	Lane blockage has been reduced by approximately 10 minutes. The costs of delay due to this improvement has saved the Turnpike customers $41.8 Million. It is estimated that 77 crashes were prevented in one year; based on a cost of $30,000.00 per crash, calculates to a savings benefit of $2.3 Million.
Advanced traffic Management System (ATMS)	Salt Lake Valley, Utah	Incident data was collected for a duration of 5 years for 3 major interstates that account for 77% of assisted incidents	The average incident duration decreased by approximately 20 minutes. The decrease in incident duration was highest for incidents affecting 2 lanes of traffic with over a 36% decrease (37 minutes). Local responses increased from approximately 2,500 incident responses in 2000 to over 5,000 incident responses in 2002
Evaluation of the Advanced Regional Traffic Interactive Management and Information System (ARTIMIS)	The metropolitan areas of Northern Kentucky and Cincinnati Ohio	This study examined the benefits of closed circuit TV cameras (CCTV), portable dynamic message signs (DMS), highway advisory radio (HAR), freeway and ramp reference markers, freeway service patrols, time-saving incident investigation equipment, and advanced traveler advisory telephone services	Travel time delay was reduced by approximately 12,000 hours per AM peak period, and 6,940 hours of unexpected delay per PM peak period. Fatalities were reduced by 3.2% for peak periods. Hydrocarbon emissions and carbon monoxide emissions were reduced by 3.8% during the AM peak period, and 3.6% during the PM peak period. Nitrogen oxide emissions were reduced by 4.7% during the AM peak period, and 4.5% during the PM peak period

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
San Antonio TransGuide System	San Antonio, Texas	26 miles of downtown freeway were equipped with dynamic message signs, lane control signs, loop detectors, video surveillance cameras, and a communication network	The system reduced primary accidents by 35%, reduced secondary accidents by 30%, reduced inclement weather accidents by 40%, and reduced overall accidents by 41%. There was an average reduction in response time of 20% which had an average delay savings of 700 vehicle-hours, and a fuel consumption decrease of 2600 gallons per major incident which calculates into an annual savings of $1.6 million
The Georgia Department of Transportation NaviGAtor Program	Atlanta, Georgia	The NaviGAtor system includes a Traffic Management Center (TMC), TMC operators use vehicle detectors, CCTV cameras, Dynamic Message Signs (DMS), and ramp meters to collect traffic data and manage incidents	Secondary crashes in the coverage area were reduced by 69%, with a 21-minute reduction in incident duration time and a reduced incident delay of 7.25 million vehicle hours, annual gasoline consumption was reduced by over 5.17 million gallons, and diesel consumption decreased by nearly 1.66 million gallons a year, carbon monoxide emissions fell by 2,457 tons. The motorist assistance program resulted in a cost savings of more than $187 million
Oregon's Region 2 Incident Response Program	Eugene, Oregon	The freeway service patrol was expanded to (2) 50 mile test corridors on rural Highway 18 and Interstate 5	The duration of delay-causing incidents decreased by approximately 30% on Highway 18, and 15% on Interstate 5. The average cost to travelers of delay-causing incidents on Highway 18 decreased approximately $42,000 (66%). The Interstate 5 corridor experienced a drop of approximately $12,000 (36%) per incident
Impacts of Electronic Toll Collection on Vehicle Emissions	Orlando, Florida	The Holland East Toll Plaza has 14 toll lanes. This study evaluated the reduction in vehicle emissions	The total number of vehicles using the Holland East Toll Plaza increased by 30%. The overall reduction in Carbon Monoxide was 7.29%, and Hydrocarbons was 7.19%.

SUMMARY OF ITS BENEFITS
SOURCE: USDOT WEBSITES AND PSAC MEMBERS

PROJECT	LOCATION	SUMMARY	BENEFITS
Traffic Benefits of E-Z Pass at the New Jersey Turnpike	New Jersey	The study measured traffic counts, queue lengths, lane configurations, and transaction times during peak periods at 27 toll locations	Delay was reduced by approximately 85% for a total savings of 2,091,000 vehicle-hours per year, and E-Z Pass user delay was reduced by 1,344,000 hours per year. The user cost savings was $25.1 million, and the user cost savings related to fuel consumption was $1.9 million per year. As a result of reduced queuing, fuel consumption estimates have been reduced by 1.2 million gallons a year. VOC emissions have been reduced by 0.35 tons per weekday
State Truck Activities Reporting System (STARS)	Montana	The STARS system uses weight-in-motion (WIM) sensors installed directly in traffic lanes to collect vehicle weight and classification at 28 sites	The percentage of overweight vehicles in the traffic stream decreased 22%. The cost savings associated with the statewide reduction in pavement damage from overweight vehicles on the Interstate was $0.7 million and $3.4 million for non-interstate-NHS/Primary systems
Denver Regional Transportation District Automatic Vehicle Location System	Denver, Colorado	The Automatic Vehicle Location (AVL) system improved the ability of dispatchers to adjust on-street operations, and increase safety through better emergency management with on-board silent alarms	The number of vehicles that arrived at stops early decreased by 12%, the number of passengers per vehicle that arrived at stops late decreased by 21%. On-board silent alarms lowered assaults per 100,000 passengers by 33%. There was also a 23% decrease in lost service hours
Para transit Transportation Outreach Program	San Jose, California	ITS improvements were made to the Para transit transportation program which included a digital geographical database, an Automatic Vehicle Location (AVL) system, and an automatic scheduling and routing system.	Ridership increased with a better on-time performance, and there was a $500,000 reduction in operating costs. The number of shared rides increased from 38% to 55%, the Para transit fleet was reduced from 200 to 130 vehicles, and the cost per passenger mile decreased from $4.88 to $3.72