

SMART PARTNERSHIPS

A Shared
Commitment to
Improve Technology



U.S. Department
of Transportation

**Federal Highway
Administration**



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INTRODUCTION

The FHWA is charged with meeting the Nation's need for the safe, efficient, and environmentally sound transport of people and goods. This ambitious goal can be broadly divided into efforts toward the dissemination of innovative technology, safer highways, environmental issues, and strengthening the professional ability of the highway community. Recognizing that some of these challenges go beyond the means and expertise of any one organization, the FHWA has continued to work toward the creation and nurturing of leveraging partnerships.

In business it's called permeable boundaries. By this synergistic arrangement, competitive and/or allied organizations combine resources to achieve a common goal. All partners invest based on their individual strengths, whether through contributed funds, expertise, equipment, or other means, and all profit from the project's success.

For the FHWA, limited funds and vast potential for highway-system solutions have required that such leveraging relationships become a way of doing business. The FHWA's National Priority Technologies Program, which encourages regional private-sector partnerships to improve responsiveness to problems and leverage Federal resources, is an example of this. The FHWA participates in many partnering alliances, which flourish because of the benefits all partners enjoy.

The most obvious benefit of the FHWA's leveraging partnerships is better allocation of all members' resources. All organizations are driven to use resources in the most efficient way, but government agencies in particular are under intense

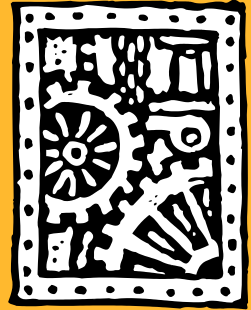
pressure to do more with less. Therefore, it is imperative that funding is both allocated wisely and also multiplied by matching contributions—financial and in-kind. Successful collaborations have been achieved through information sharing and cost sharing.

In many cases, partnerships that involve interests from all areas of the transportation industry have also effected improved responsiveness to transportation needs and concerns—directly supporting the FHWA’s mission of ensuring the timely dissemination of innovations to the highway community. Further, the early involvement of a project’s stakeholders facilitates acceptance and implementation of new technology and methods.

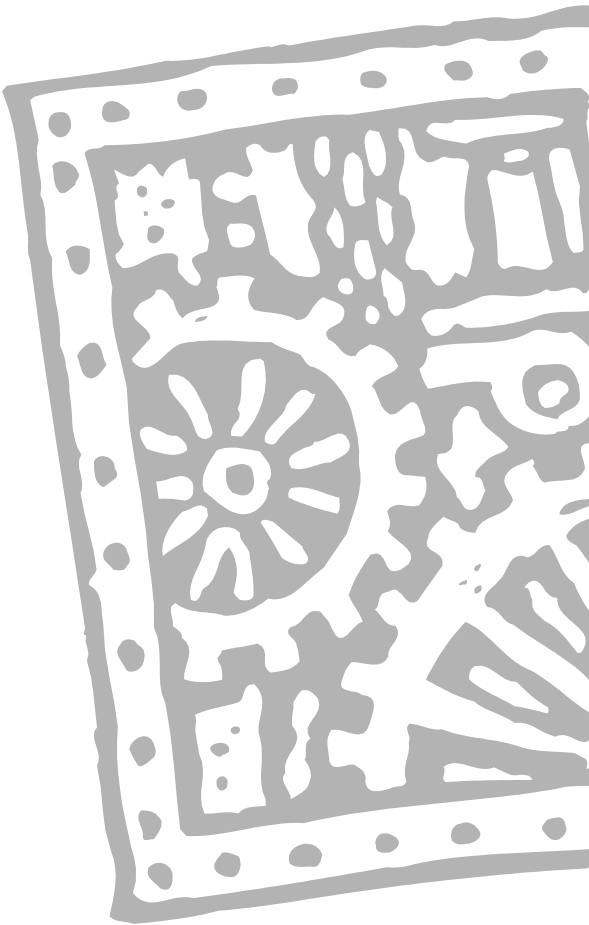
The relationships forged by the FHWA’s transportation alliances have intrinsic benefits, as well. Closer collaboration between Federal, State, and local entities improves communication and cohesion between the organizations. Gradually, a culture of partnering is created. The formation of the partnerships also creates powerful potential for the broad public-private interest alliances to establish agendas that further benefit the highway community.

However, the ultimate benefit of the FHWA’s partnering ventures is advancement toward better, safer roads at the lowest cost possible. Whether governmental, private-sector, or academic entities, all partners are driven by this underlying goal. The articles that follow describe collaborations that exemplify the FHWA’s work toward providing a safe, efficient, environmentally sound highway system.

LEVERAGING FOR INNOVATIVE SOLUTIONS



Partnerships
and shared
resources
combine to
advance
state-of-the-art
technology



Traffic Control Partnership Takes the Latest Technologies to the Road

Although technologies for alleviating congestion and improving mobility and safety exist, there is a need for transportation authorities to become better aware of these traffic control technologies and roadway management programs. Two mobile demonstration projects—cooperative partnerships between manufacturers, transportation agencies, and academia—were developed to mobilize and demonstrate such advanced technologies to users.

Manufacturers worldwide have joined the FHWA to form partnerships in which industry supplies the latest available technology and the government supplies labor and resources to mobilize and demonstrate the technology. The first of the two projects focuses on urban intersection control, while the second concentrates on proven corridor management technologies. A mobile exhibit and classroom for each project, in the form of a custom-built tractor-trailer combination with expandable sides, allows instruction and hands-on experience with the equipment.

The intersection control program, offered from January 1993 to July 1996, was developed to promote the installation of better traffic control systems to achieve immediate congestion reduction at urban intersections, provide instruction on the operation of equipment and software not widely used, and raise awareness of the benefits of advanced technology. More than 40 organizations, including manufacturers and systems software firms, provided resources for the project, attended by more than 2,000 traffic professionals and managers. A report of the project's benefits will be completed in early 1997, but as an example, for each \$1 spent on signal timing optimization—which costs \$300 to \$400 per intersection annually—15 to 20 gallons of fuel can be saved.

The second mobile classroom, being configured by California Polytechnic State University, features corridor management technologies provided by approximately 35 industry partners including Allied Signal, Automatic/Eagle Signal, PEEK, Siemens, and Lockheed Martin. The program, scheduled to begin in April 1997, was initiated to provide transportation authorities nationwide the opportunity to learn about the technologies.

Both programs offer clear benefits on every level of involvement. However, the greatest advantages of the cooperative efforts are reaped by the driving/taxpaying public, who benefit from the projects' promotion of traffic management programs to relieve traffic congestion and the economic benefits of reduced congestion.

Coalition Applies Space Shuttle Technology to Develop Superior Skid-Resistant Coating

Demonstration testing of an innovation of the Space Shuttle Solid Rocket Booster (SRB) program has been undertaken by public and private-sector partners dedicated to proving its value as an economical, environmentally sound skid-resistant process. Convergent Spray Technology (CST)[™] is being investigated as an alternative to the maintenance procedures currently used to prevent skidding on concrete pavements such as bridge surfaces. Each of the techniques presently used entails an expensive application, traffic disturbance, and often, far too short a useful life.

Research toward the development, testing, and field demonstration of CST skid-resistant coatings is being conducted by NASA's Marshall Space Flight Center (MSFC), the Alabama Department of Transportation (AL DOT), and United Technologies Corporation's USBI Co., a contractor on the SRB program. Of the estimated \$166,000 total budget, 61 percent is being contributed by NASA and industry partners with the balance funded by the FHWA's National Priority Technologies Program.

"This effort could not have been accomplished without all the partners working together," said John West, an MSFC engineer on the project. "Each member brings special expertise, skills, and capabilities to the coalition, so that by working together, we accelerate the development and testing of this new CST application."

USBI and AL DOT, in conjunction with MSFC, applied the overlay—which consists of an environmentally benign resin

binder and fine, very hard aggregate—to a bridge deck section on I-65 in October 1996. Using the convergent spray process, the coating was applied in less than one hour, and traffic resumed in the test lane four hours later. Evaluation of the coating’s durability will advance the project’s eventual goal of developing better, faster, and cheaper commercial applications for bridge deck surfaces.

The coalition’s work toward development of the convergent spray, mix-on-demand process promises benefits extending to the industry and driving public. This efficient, cost-effective process is expected to increase driver safety, directly and indirectly lower bridge maintenance and repair costs, and greatly extend the life of such concrete surfaces.

WesTrack Team Combines Industry's Expertise and Resources for Pavement Research

The 2.8-km-long loop of test track in western Nevada known as WesTrack represents one of the largest public-private partnerships in FHWA's current pavement research program. The WesTrack team—a cooperation of the asphalt paving industry, contractors, material suppliers, the trucking industry, universities, and State governments—represents the combined expertise and resources of the industry.

Constructed in 1995, WesTrack comprises 26 experimental hot mix asphalt pavement sections being loaded to failure by driverless heavy trucks over a 2-year period. This cooperative arrangement is executed by eight key members and draws upon the greatest strengths of each: the FHWA (funding of the project, technical expertise and guidance); Harding Lawson Associates (track design and construction quality assurance); Granite Construction Company (track construction); the Nevada Automotive Test Center (prime contractor and development/operation of the driverless vehicles); Nichols Consulting Engineers (performance monitoring and development of performance-related specifications); and three universities, Oregon State University, University of Nevada-Reno, and University of California-Berkeley (the study's laboratory testing program).

In addition to the key partners, private companies supplied most of the elements of the driverless trucks at no or reduced cost, in exchange for performance data on their products. These participants include Navistar (tractor rigs), Detroit Diesel (engines), Twin Disc (automatic transmissions), Goodyear (tires), Midland Grau (anti-lock braking systems), Alcoa (wheels), Disk Lock, and East

Pennsylvania Manufacturing (batteries). Two other companies, Huntway (asphalt) and Roadtec (material transfer vehicle), made significant contributions to the track construction.

WesTrack's experiments are supporting FHWA's pavement technology program through two objectives: development of performance-related specifications for pavement performance; and evaluation of the Superpave mixture design and analysis system. These goals will be accomplished by showing how deviations of materials and construction properties (e.g., asphalt content and air voids) affect performance, and through Superpave-mixture-analysis testing on materials from all test sections and comparisons of observed and predicted performance.

Secondary benefits of the program are being realized in the form of the driverless vehicles created to avoid the risk of test-driver fatalities; the performance data provided to trucking industry participants on their components; and use of WesTrack's pavements for auxiliary experiments.

Drawing upon the resources and skills of the industry's public and private organizations, the WesTrack program progresses toward the partnership's common goal: development of the safest, best maintained roadways.

Leveraging Resources to Demonstrate the Latest Traffic Surveillance Technology

To accelerate the infusion of a new traffic-surveillance technology into use by transportation authorities, a collaboration of academic and public interests initiated a limited-scale demonstration in mid-1995 that takes advantage of fund-leveraging and the technical expertise of its partners. The semiautonomous unmanned aerial vehicle (UAV), referred to as a drone, is being developed by the Georgia Institute of Technology in response to limitations and high costs of manned helicopters and the Automatic Traffic Management System (ATMS) cameras in the Atlanta metro area.

The demonstration project is being implemented by a team representing the Georgia Institute of Technology and the Georgia Department of Transportation (GDOT). Georgia Tech provides student work, significant cost sharing, and a laboratory built to support development of the traffic surveillance drone. The institute also leverages technology for the project through its defense-related programs, and GDOT contributes funding. Of the program's estimated \$225,000 funding, about \$75,000 is provided through the FHWA's National Priority Technologies Program.

In addition to demonstrating this novel surveillance vehicle, the program promotes the benefits of the UAV as a fully autonomous system, the development of which is estimated to cost \$3 million. Funding to implement the entire system will be easier to garner after the project's demonstration in mid-1997.

"The partnering arrangement offers the unusual opportunity to design an advanced unmanned aerial vehicle for a specific application," explains Dr. Robert C. Michelson of the Georgia Tech

Research Institute. The program is generating side benefits, as well, he adds. “We’ve been able to develop new tools for future work on advanced vehicles. The opportunity to be involved in cutting-edge technology also provides real-world experience to the students assisting in the development.”

It is estimated that the drone will operate for as little as 17 percent of the annual cost associated with a manned helicopter. For about the same cost as a single, quickly shuttling manned helicopter, a fleet of five UAV drones will be five times more responsive to multiple traffic crises.

Industry Experts Connect on Bridge-Rehabilitation Research

A partnership of industry experts from academia, State and Federal agencies, and the composite industry is researching a system intended to replace deteriorated concrete bridge decks more quickly and at less cost than conventional decks. The system of bridge deck modules, made of noncorroding composite materials, has been developed to reinforce deteriorating bridges before expensive reconstruction is required.

To test the rehabilitation technology based on a systems approach, a research effort has been undertaken by West Virginia University's (WVU's) Constructed Facilities Center, the West Virginia Department of Highways (WVDOH), the U.S. Army Corps of Engineers, and the Society of Plastic Industries/Composite Institute (SPI/CI) and member companies including Owens-Corning, PPG Industries, Inc., Creative Pultrusions, Inc., Ashland Chemical Corporation, BTI, and Reichhold Chemicals, Inc. The proposed technology, which uses advanced composite materials in structural systems with optimized fiber-reinforced plastic modules, was developed as part of WVU's ongoing research in this area.

The research program receives 27 percent of its estimated \$302,000 budget from FHWA's National Priority Technologies Program. WVU is interacting with two Army laboratories to conduct large-scale and specific testing, and with WVDOH for general assistance. Estimated costs of \$40,000 to \$45,000 for manufacturing, materials, fabrication, technical process royalties, and engineering are being absorbed by composite industry participants. In addition, Creative Pultrusions, Inc. has expended approximately \$50,000 in manufacturing costs.

The modules are preassembled in a shop under controlled conditions, ensuring quality and taking advantage of their light weight. Once in use, the system is expected to be used to replace bridge decks and to construct short-span bridges. The prefab modules may be stockpiled and quickly installed, with minimal downtime and inconvenience to motorists. They also lengthen the life of a bridge when used as deck replacements.

Through this collaboration of public, private, and academic entities, new technology is being developed to solve transportation problems while saving time and money. The commitment of all participants will ultimately result in the safety promised by structurally sound bridges.

Trucking Industry Works to Electronically Link Its Information Systems

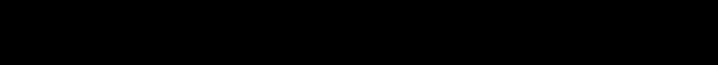
A broad partnership of public, private, and academic interests is working to create a network to electronically exchange information between essential systems of the trucking industry. Commercial Vehicle Information Systems and Networks (CVISN) includes information systems owned and operated by State/local governments, carriers, and other stakeholders, and involves the participation of all.

To date, CVISN (pronounced “see vision”) has been deployed in Connecticut, Kentucky, Michigan, Minnesota, Colorado, California, and the Washington/Oregon alliance. The FHWA is providing 50 percent of the \$2 million budget over the 1996 and 1997 fiscal years. The rest of the funding is contributed by the other participants, including State agencies, Johns Hopkins University, R.S. Information Systems, consultants, and 30 or more trucking companies in each State. As many as eight government agencies—including State police, revenue agencies, departments of motor vehicles, and departments of transportation—are involved in each of the pilot States.

CVISN is not a new information system, but rather a way for existing systems to electronically exchange information through use of standards and the U.S. commercially available communications infrastructure. The CVISN Core Infrastructure allows a mechanism for the exchange of safety information, registration, fuel tax, HAZMAT, and commercial driver license information among States through a group of key information systems. The Core Infrastructure is also designed to provide the motor carrier

operator with a means for electronically obtaining the necessary credentials to operate legally, thereby eliminating the need for numerous trips to various State agency offices.

Full deployment of the program to all States is CVISN's long-term objective, with more effective trucking operations expected by the year 2005 due to the availability of accurate information in an electronic format. The program is unique in that it is entirely voluntary, with public and private organizations motivated by a recognition of the value of the technologies to public safety and private-sector efficiency.

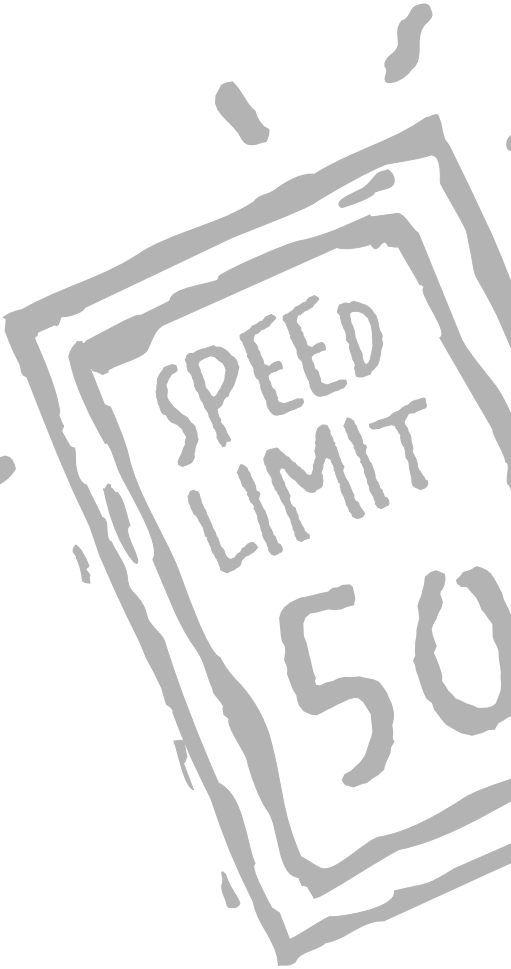


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SAFETY IN NUMBERS



**Dedicated
partners in
community
outreach
improve
highway safety**



Community Safety Programs Put the Brakes on Red Light Running

To address a growing inattention to traffic controls, the FHWA created the Red Light Running (RLR) reduction campaign, a comprehensive public service outreach effort combining the resources of communities and local-level interests across the country. Disregard of traffic controls is the leading cause of urban crashes in the United States today. According to the Insurance Institute for Highway Safety, such incidents represent 22 percent of the total number of crashes and FHWA estimates these to have an estimated economic impact of \$7 billion.

RLR was launched in Charleston, SC, in May 1994, with cooperation from local public agencies and the private sector. The extremely successful results—including a 48 percent viewer recognition rate of Public Service Announcements (PSAs) and a reduction in traffic incidents at intersections with signals—contributed to the FHWA’s decision to implement the RLR campaign in communities nationwide.

In the 1995 and 1996 fiscal years, FHWA awarded RLR “seed money” grants to 26 communities that had documented red light running as a traffic safety issue and were interested in implementing local campaigns to counter the problem. In addition, individually tagged PSAs were provided to each community and technical and marketing support made available for the length of the community campaign.

The grant communities have developed traffic safety partnerships with various local businesses, whose visibility in the project generates public good will. These businesses include manufacturers (Cooper Tire & Rubber Co.), grocery stores (Giant Food, Inc., Wawa Food Markets), local government offices such as sheriff’s

and police departments, chambers of commerce, and public schools. Contributions from State and local partners in the form of billboard space, transit signage, printing, newspaper articles, milk carton PSAs, and monetary donations accounted for an estimated 71 percent of the campaign's 1995-1996 funding.

The campaign itself consists of PSAs appearing in radio, print, and other media, and emphasizing the tagline, "The light is red for a reason. So stop." The decision was made to implement RLR locally rather than nationally because it was felt that local organizations, safety coalitions, and law enforcement agencies are best qualified to execute the program.

The efforts of the FHWA and its local partners to increase the driving public's awareness of roadway-safety issues translate into safer roadway conditions with decreased economic consequences nationwide. As an added benefit, the traffic-safety partnerships formed as a result of red-light-running programs hold a powerful potential to establish further safety agendas.

Traffic Safety Partnership Helps You “Read Your Road”

Imagine a highway safety guide to be found in every driver’s glove compartment, with important safety information presented in an attractive format that invites drivers to reach for it continually. That was the goal when the FHWA created the compact and colorful brochure, “Read Your Road: Every Highway User’s Guide to Driving Safely,” the centerpiece of its new driver safety campaign. The FHWA is working with public and private highway safety partners to get the guide into the hands of every highway user.

The FHWA formally unveiled the new publication in November 1996, when a comprehensive marketing program packet was distributed to more than 500 transportation-related organizations and tourism/travel interests, generating much enthusiasm. To broaden the booklet’s availability, the FHWA is working with its highway safety partners from the public and private sectors to assist with the publication’s printing and distribution. In addition, nontraditional partnerships are being cultivated with organizations from the health care, retail, and food industries. These organizations are printing the brochure with their logos next to the U.S. DOT’s and distributing copies to their customers. By this arrangement, the companies provide a service to their customers, the customers receive a complimentary driving aid, and the national safety message is disseminated.

The “Read Your Road” campaign was developed to explain the ways in which safety is an important element of road design. It educates drivers on how to benefit from these safety features by knowing how to recognize them. The National Highway Traffic Safety Administration and the National Association of Governor’s Highway Safety Representatives provided invaluable expertise on important safety issues, including occupant protection and safety of pedestrians and bicyclists.

As a result of the efforts of this traffic safety partnership, “Read Your Road” may be offered by insurance agencies, vehicle manufacturers, and tourist agencies across the country someday soon. The benefits of the highway system’s built-in safety features can be realized only if motorists recognize and use the information furnished. By providing all highway users with this guidance in an easy-to-use format, the campaign’s safety partners are advancing that goal.

SPEED
LIMIT

Industry Guides Research Toward Earthquake-Safe Bridges

The State's high incidence of earthquakes is a driving force in the California Department of Transportation's (Caltrans') interest in developing high-strength fiber composites for retrofit of bridges and other structures. In November 1994, Caltrans announced a program to generate data for the evaluation of retrofit composite materials, and invited input from the industry. With the guidance of industry participants, research into this work is being implemented by a partnership of committed entities.

The program focuses on two areas of application: seismic retrofit of bridges, and bridge strengthening and rehabilitation. The objectives are to identify acceptable methods of material testing and analysis; system specifications for manufacturing, quality control, and application; and design guidelines.

An advisory panel was formed to oversee work done by program participants and to reach a consensus on the evaluation process. The panel comprises representatives of Caltrans, the FHWA, academia, industry, and the Society for Advancement of Material Process Engineering (SAMPE).

To combine its structural engineering knowledge with the experience and strengths of other agencies, Caltrans formed a cooperative with the Aerospace Corporation and the University of California at Irvine (UCI). The Aerospace Corporation addresses material related issues, while structural testing is conducted at UCI's laboratories. In addition, SAMPE handles contractual agreements with the manufacturers, expediting the process and minimizing administrative burdens.

Proposed funding of the Caltrans composites-evaluation program, both in-kind and monetary, is approximately \$800,000. Of the total amount, it is estimated that 25 percent is to be contributed by the FHWA's National Priority Technologies Program, 50 percent by Caltrans, and 25 percent by industry partners.

"The funding provided to industry members is helpful, and because materials testing for the six to eight systems by various companies is being done in bulk, they're saving as much as half the cost of testing individually," says Mohsen Sultan, chief of the New Technology Management Branch of Caltrans. "The program will produce 10,000 hours of testing that did not exist before—information that is vital to address engineering concerns—and will produce as many as eight composite-material alternatives to conventional materials, with proper testing and analysis specifications. Because of communication with other State DOTs, this can be expected to have a nationwide impact."

The Caltrans partnership is expected to identify economical alternatives to conventional materials and provide clear guidelines for their effective use in infrastructure applications. Furthermore, it is hoped that the new data will foster other composites applications for structural reinforcement. The industry benefits as well, with national exposure for its products through the program.

Traffic Safety Coalition Explores Advanced Technologies to Assist Law Enforcement

The improved collection of traffic accident data directly affects improved safety on the road by providing transportation planners with better information. That is the idea behind ALERT (Advanced Law Enforcement Response Technology), a computer-based system to help police officers collect complete, standardized information at crash sites. The FHWA, in partnership with the National Highway Traffic Safety Administration, Texas Department of Transportation, Texas Department of Public Safety, Texas Transportation Institute, the College Station Police Department, and more than 30 private companies, has developed and tested the ALERT system in two police vehicles.

ALERT reduces the multiple systems that activate in-vehicle systems from the cockpit, and replaces them with a touch-screen display and hand-held, pen-based remote unit linked to a specially developed, rugged host computer located in the vehicle's trunk. The hand-held computer includes report forms, allowing data entry at the accident scene and immediate electronic filing in State records databases or the officer's base station. Errors are reduced through a software editor and minimal handling of the data. The officer's safety is also improved by immediate access to all available information through the on-board computer—without his having to leave the vehicle or go through dispatch. Additionally, a global positioning satellite automatically transmits the officer's location to headquarters.

The ability to adapt existing technical software and hardware for new commercial purposes has attracted unprecedented support for ALERT from a wide range of public institutions and private industry. Private companies—including Eastman Kodak, AT&T

Wireless, Epson, Lucent Technologies, Motorola, and Texas Instruments—have taken the lead in modifying software and hardware to conform to ALERT requirements and to provide equipment, licensing, and long-term technical support to the project. This spirit of cooperation has significantly reduced the government's cost to support the project. Involving the academic community encouraged students to pursue research grants and special projects that have further improved the ALERT technology.

The test of a true partnership is the willingness of those involved to participate not only in the development of a technology but also in ensuring that it is transferred successfully to the target audiences. Two ALERT enforcement vehicles are being tested, evaluated, and showcased by a Texas State trooper and a College Station Police Department officer, and the International Association of Chiefs of Police is assisting in the effort to showcase the vehicles to appropriate audiences.

Native American Groups Solve Traffic Safety Problems Through Community Cooperation

The Community/Corridor Traffic Safety Program (C/CTSP) is not new to traffic safety professionals, but its use by the Native American community represents a great stride toward improved highway safety for the group. This innovative program, which brings together financial and community resources to solve safety problems on the nation's high-crash corridors, is being implemented by an alliance of public highway agencies and Native American health organizations.

The C/CTSP is being implemented by four Indian reservations in North Dakota through the dedication of broad interests including the FHWA, the Bureau of Indian Affairs, the National Highway Traffic Safety Administration (NHTSA), the North Dakota Department of Transportation (NDDOT), the Indian Health Service, and the Native American Injury Prevention Coalition. The program is coordinated by Dennis Renville, executive director of the Coalition, which represents tribal leaders and committee participants of the State's four tribal communities: the Spirit Lake Dakota, the Standing Rock Sioux, the Turtle Mountain Band of Chippewa, and the Three Affiliated Tribes. Members of the Coalition have identified priorities to be evaluated and implemented in cooperation with the program's other partners.

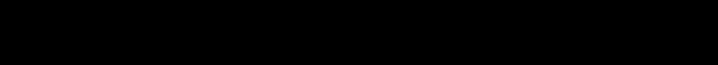
Mr. Renville explains that through C/CTSP, "State and Federal authorities offer help and suggestions that empower the tribes to identify their problems and use tools already in place to solve them." He adds that it's because of efforts like this program that the relationship between the tribal community and NDDOT is perhaps the best among all State DOTs.

The partners have undertaken two small projects to demonstrate the effectiveness of the program: the installation of road signs near casinos reminding motorists not to drink and drive, and work with the school system to adopt a “Book Bag Project” (a pedestrian safety initiative through which school children retroreflectorize their book bags to be more easily seen by motorists). Opportunities exist for many more such efforts to be achieved as the program and its partnerships grow.

C/CTSP has been implemented by many States, substantially reducing highway accidents on dangerous corridors. For each high-crash corridor identified, program participants consider as many countermeasures as possible. Rather than reinventing the system, C/CTSP encourages the solution of problems through programs already in place. To achieve such improvements requires the cooperation of Federal, State, and local agencies, particularly those involved in emergency services, public awareness, and highway design, construction, and maintenance.

Upon the creation of C/CTSP in 1994, NHTSA and FHWA provided limited start-up funds to seventeen States, with each receiving a \$10,000 grant. However, the majority of the program’s resources and expertise is provided by the State and its public and private organizations dedicated to reducing highway fatalities.

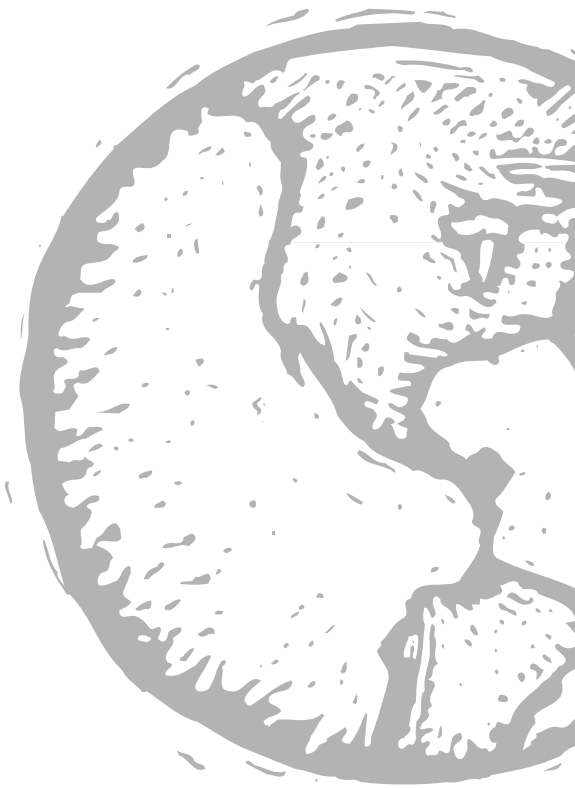
“For community traffic safety programs to succeed, the community needs to take the initiative,” says Timothy Garey of NDDOT. “It’s encouraging for NDDOT to see the tribal community taking ownership of the program because it’s credible, well researched, and (the tribes) have a vested interest in its success.”



ENVIRONMENTAL VIGILANCE



**A safer
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Transportation Alliance Works to Ensure Safe Industrial Waste Reuse

A cooperation of the FHWA, the Indiana Department of Transportation (INDOT), Purdue University's School of Civil Engineering, and Indiana's Cast Metals Association (INCMA) is undertaking field-scale assessment of new testing protocols that help to quickly assess the safety of industrial waste materials. Although constructive reuse of industrial residuals represents an attractive goal to DOTs nationwide, fear of unforeseen material hazards has been a hindrance to the practice. The analytical testing methods to determine a residual's potential level of waste effluent toxicity were developed by INDOT to counter this fear.

INDOT maintains primary oversight of the project, with Purdue University directing the testing of two bioassay protocols. The FHWA's National Priority Technologies Program and INCMA provide financial support, and INDOT is working to foster additional funding partners from the cast metals industry. Auburn Foundry Inc., for example, is providing all materials and transportation at one of the test sites. At the time of the project's proposal, funding for the 2-year project was estimated at \$190,500, with 61 percent provided by INDOT, Purdue University, and INCMA.

The field-scale testing involves two projects, separately testing coal ash and spent foundry sand. The testing will develop routine specifications for bioassay testing of residuals being considered for future construction purposes. These results will establish a protocol for future use of bioassay procedures, thereby promoting similar activities for constructive waste reuse.

The verification of bioassay protocols promises significant environmental and economic benefits. It will allow DOTs to convert numerous high volume residuals into construction products with reduced fear of liability. Such DOT operations nationwide will provide considerable volume savings to landfill operations. From an economic point of view, waste generators (foundries, power plants, etc.) will be relieved of the financial and legal burden residue materials represent, while DOTs will benefit from the use of typically “free” construction materials.

Each of the project’s partners stands to reap significant gains by this work. However, the greatest benefits of their dedication to industrial waste reuse will be seen in economic, safe road construction applications that reduce landfill burdens.

Common Vision Supports Team's Efforts Toward Safer Work Environment

When their chance conversation led to the joining of complementary projects, it is doubtful that the FHWA official and National Asphalt Paving Association (NAPA) paving contractor involved recognized the formation of a partnership that has been called “the model for the 21st century.” This collaboration between government, industry, and union interests promises to reduce or eliminate paving workers' exposure to asphalt fumes.

As a result of interests raised at the 1993 NAPA Annual Convention, NAPA members initiated a cooperative with paving equipment manufacturers to explore how the concentration of asphalt fumes workers are exposed to during laydown operations might be reduced or eliminated. A NAPA Task Force of contractors, paver manufacturers, oil company representatives, and other interests had developed a prototype control package, but testing and evaluation were needed.

At the same time, the FHWA was working with the National Institute for Occupational Safety and Health (NIOSH) to determine the environmental and health effects of using recycled tire crumb-rubber modifiers in asphalt, including hot mix asphalt, per the mandate of the Intermodal Surface Transportation Efficiency Act of 1991.

The serendipitous conversation between representatives of the FHWA and NAPA led to a pledge to combine resources and technology to reduce or eliminate asphalt fumes exposure at the paving site. Through the spirited cooperation of each partner,

equipment manufacturers—including Blaw-Knox, Cedarapids, Inc., Roadtec, Inc., Barber-Greene/Caterpillar, and Ingersoll-Rand/Champion—developed the technology and supplied pavers to test, FHWA funded the NIOSH study, NIOSH worked with NAPA and the Asphalt Institute to develop testing of ventilation systems, and NAPA provided job sites and contractors to conduct the tests. Organized labor groups, the hot-mix-asphalt industry, and the EPA were also instrumental for their expertise and support.

Together, the partners developed a ventilation system to capture heat and fumes from the auger section of the paver through a system of ducts and blowers, discharging them away from workers. In addition to solving the problem, the cooperative established voluntary guidelines for implementing the controls. The stakeholders agreed to incorporate the new ventilation system in all highway-class pavers manufactured after July 1997, with retrofit kits available by July 1998.

The efforts of this exemplary partnership demonstrate that improving the quality of the working environment is technologically and economically feasible. NAPA Member Bob Thompson, president of Thompson-McCully Company, revealed, “What makes the partnership work is having common values and a common vision.”

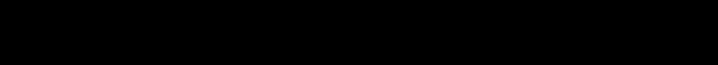
Publication's Success Evidence of Mutual Commitment to Fly Ash Use

Driven by common interests, the FHWA and the American Coal Ash Association (ACAA) have enjoyed a successful partnership for many years, collaborating on seminars and issues of shared concern. Both organizations are dedicated to promoting the use of fly ash, a coal combustion by-product with numerous engineering applications, including concrete pavement and bridge construction. The partners created *Fly Ash Facts for Highway Engineers* to encourage the use of fly ash in transportation applications.

The industry's great interest in the publication, combined with the substantial amount of new information on fly ash use accumulated in the previous decade, prompted its updating in 1996. The ACAA's industry members updated and produced *Fly Ash Facts*, contributing their time, expertise, and money. Fly ash experts from the FHWA collaborated on the update and paid for its printing. The popularity of the publication is reflected in the rapidity in which the supply of copies was depleted. Within a year of the update, ACAA reprinted the booklets and continues to distribute copies.

Cooperative efforts between the FHWA and ACAA support the FHWA's goal of promoting the use of fly ash to produce durable concrete, while also advancing the ACAA's move to encourage the use of industry's waste products in construction. Of the 82 million metric tons of fly ash produced annually, 11 percent is used in engineering applications, of which 65 percent is used in the transportation industry.

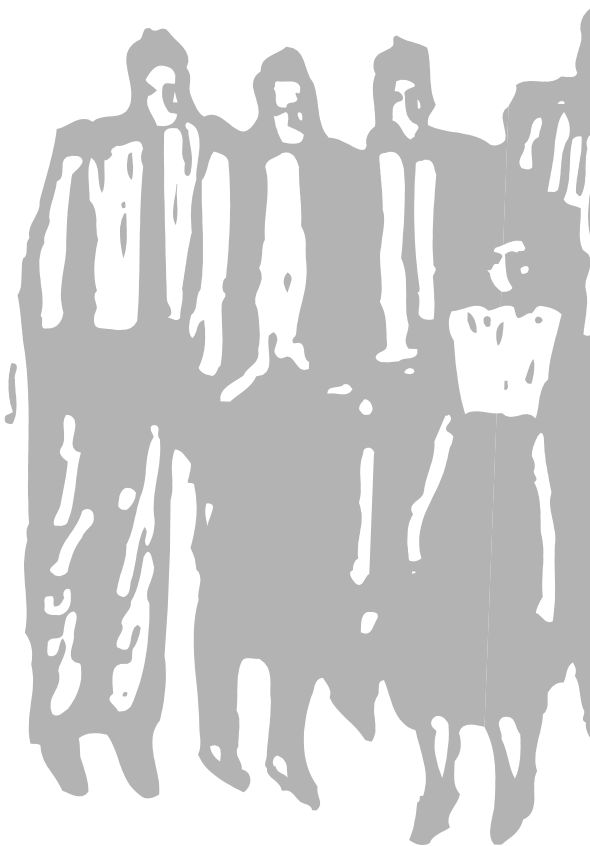
The collaboration involved in producing the updated *Fly Ash Facts* is just another example of FHWA and ACAA's shared commitment to the use of fly ash in concrete pavements and structures. With such complementary objectives and resources, the partnering relationship between the FHWA and the ACAA is certain to be a productive one for many more years.



BUILDING PROFESSIONAL CAPACITY



**Collaborations
that provide
widespread
training and
information
sharing**



Alliance Promotes Superpave Training and Technology Through Regional Centers

The Superpave (SUPERior PERforming Asphalt PAVEMENTS) asphalt research program was developed to design asphalt pavements to meet the needs of the next century. To promote its objectives, organizations from all areas of the pavement industry have joined to provide the technical training and assistance that will ensure that highway professionals have the expertise to achieve more durable asphalt pavements. This work is being accomplished through the establishment of five Superpave Regional Centers nationwide.

The Superpave centers are funded and operated by a broad partnership representing public and private sectors and academia. Operations are overseen by an advisory group with members from the FHWA, State highway agencies, five regional asphalt user-producer groups, materials suppliers, contractors, consultants, and the universities. Five State universities are partners, with a center located on each campus: Pennsylvania State University, Purdue University, Auburn University, University of Nevada-Reno, and University of Texas at Austin.

The State/university team provides laboratory space, equipment, and technicians, and the FHWA provides equipment and initial training through a contract with the Asphalt Institute. The loan of staff from State highway agencies and industry associations provides the centers with the expertise of seasoned professionals, while training those professionals in Superpave equipment and methodologies.

The opportunity exists for further development of pavements and materials through research and development partnerships. The Superpave centers are available as a resource for R&D activities through partnerships with public agencies, private industry, or universities.

Above all, the centers are resources to assist in the strong development and widespread training required by the new, complex Superpave technology. This cooperative effort of industry, academic, and government partners working on a regional basis will ensure that the training and knowledge required by Superpave is disseminated nationwide to all areas of the highway industry.

National Industrial Alliance's "Communication Channel" Links Highway Authorities

Too often the latest advancements in traffic control technology are not utilized in a timely manner, at least partly because highway officials are unaware of the innovations. At the same time, the industry associations and manufacturers that produce traffic control products and procedures rely on those municipal officials for information concerning technology needs. Recognition of the need for a communications channel between traffic control entities led to formation of the National Industrial Alliance (NIA)—an association of public, private, and academic interests.

The establishment of an information-exchange alliance was first discussed at the spring 1994 National Technology Transfer meeting. A subcommittee was formed to study the idea, and by May 1995, the enthusiastic private sector had formed an ad hoc committee and held its first meeting. In July 1996, the committee's objectives were found to be consistent with the FHWA's technology transfer goals. Shortly thereafter, a proposal for establishment of the NIA was outlined. Supporting participants include the FHWA, University of New Hampshire, National Technology Transfer Center, American Concrete Pavement Association, NACE International, Tonya, Inc., Energy Absorption Systems, Clark-Schwebel, and American Road and Transportation Builders Association.

The NIA provides communication between vendors (equipment and software developers, associations, etc.) and municipal officials. The goal is to enable the latter to become aware of new developments, and afford them the opportunity to express their needs to the appropriate vendors. The vendors benefit with direct access to

their market. It is the duty of the NIA's Advisory Board to establish policies that ensure fair treatment for all participants and the organization's high standard of professionalism.

The NIA produces informative publications, workshops, demonstrations, and videos for products and procedures whose promotion through the "communication channel" is deemed acceptable. To ensure fairness, all companies that produce a similar product to that being publicized are invited to participate in the effort. With direction from the Advisory Board, Technology Transfer (T²) Centers serve as the links between the NIA and State and local highway authorities. Through the T² Centers, based at State universities, information provided by the NIA is distributed and the NIA informed of municipal-level needs.

All costs involved in the production of the publication are shared by the participating vendors, so the financial needs of the NIA are limited to the costs of minimal administrative support and the associated costs of operations. Though start-up funding is being provided by FHWA, the NIA must be self-supporting in 1 to 3 years. The alliance provides an ideal solution, ensuring valuable benefits to all partners at virtually no cost to them.

Concrete Seminars are Foundation for Solid U.S./India Industry Relations

The 1995 request by the India Concrete Institute and India Cement Manufacturers Association to share High Performance Concrete (HPC) technologies prompted the FHWA to organize an HPC Team, to explore future public and private partnerships in India. The team comprised members from Denton Construction Company, W.R. Grace and Company, the University of New Hampshire, New York Department of Transportation, and the FHWA, with each organization funding its involvement in the group.

In February 1996, the U.S. team visited India to offer the first international Strategic Highway Research Program (SHRP)-HPC Showcase in Delhi, Madras, Bombay, and Baroda. An estimated 800 concrete professionals from India's private and public sectors participated in the workshops, with all arrangements organized and paid for by the India Cement Manufacturers Association, the Central Road Research Institute of New Delhi, and the India Concrete Institute. In conjunction with the workshops, the U.S. team visited project sites and laboratories and shared its expertise in discussions with private and public organizations of India.

The first SHRP-HPC Showcase is the foundation for many opportunities that will benefit public and private interests from both countries. The partnership provides the public sector and academics an opportunity to explore technology transfer programs. India, whose highway infrastructure needs extensive expansion to meet the needs of a projected 100 million new vehicles, has a great

need for the U.S. concrete industry's technological expertise. U.S. construction companies are eager for commercial ventures with the world's fourth largest cement producer, and are willing to share their technologies to participate in India's emerging highway infrastructure market.

The success of the SHRP-HPC Showcase has resulted in ongoing communications between many of the participants. In a letter to Denton Construction Company, a representative of The Associated Cement Companies Limited of Thane, India, remarked, "Our knowledge has been enriched by the presentations . . . as well as through the personal discussions with (representatives of your organization)."

The enthusiastic efforts of concrete professionals from the United States and India offer significant benefits to all participants, while advancing HPC technology throughout the world. The commitment of the partners is evident in their ongoing communication and work toward establishing agreements of understanding between contractors of both countries.

Travel Demand Forecasting Interests Combine Efforts to Provide Training and Assistance

Prompted by the transportation planning and air quality requirements introduced in the 1990s, an alliance of government agencies initiated the Travel Model Improvement Program (TMIP) in 1992. Through the cooperation of the U.S. Environmental Protection Agency, U.S. Department of Energy, and agencies of the U.S. Department of Transportation (FHWA, Federal Transit Administration, and the Office of the Secretary), TMIP is successfully providing training and technical assistance at less cost and more efficiently than could be accomplished by individual entities.

Expertise and guidance are provided by all partners, who are motivated by the industry's need to develop improved travel forecasting procedures to help the States and metropolitan planning organizations (MPOs) satisfy the mandates of the Clean Air and Intermodal Surface Transportation Efficiency Acts. The FHWA has direct oversight of the TMIP and provides most of the funding. Other significant funding sources include the Federal Transit Administration, the Environmental Protection Agency, and the pooling of State funds.

TMIP is designed to implement current travel model improvements and develop new modeling procedures through five program tracks: outreach efforts, near-term improvements, longer term improvements, data collection, and land use. A TMIP Review Panel, which comprises professionals in transportation planning, land development, and environmental protection, provides guidance on the design and implementation of the program. Universi-

ties and State, local, and industry agencies are represented on the panel. MPOs and State DOTs also offer guidance on the training, technical assistance, and research provided by the program.

Information is disseminated to the industry through the TMIP Newsletter and the TMIP Web site (<http://tmip.tamu.edu>), which hosts the Travel Demand Forecasting Clearinghouse and the TMIP Communications Center, and provides a listing of available courses. In addition, technical assistance and training information are available to any transportation planning agency.

The travel model improvements will help the States and MPOs plan better, more efficient, and cost-effective transportation facilities and services, thereby saving construction costs and motor vehicle operating costs and improving air quality.

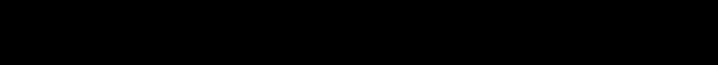
Data Sharing Provides Transportation Partners With Comprehensive Survey Results

Government agencies on the Federal, State, and local levels have pooled resources to produce the comprehensive survey that has been called “a picture of daily travel.” Through the data and fund sharing of its partners, the 1995 Nationwide Personal Transportation Survey provides information that the individual participants acting alone could not have afforded to obtain.

The survey was supported by a cooperation of the FHWA, National Highway Traffic Safety Administration, Bureau of Transportation Statistics, Federal Transit Administration, New York Department of Transportation (NYDOT), Massachusetts Department of Transportation (MassDOT), Tulsa Metropolitan Planning Organization, and Oklahoma City Metropolitan Planning Organization. Approximately 31 percent of the \$5.5 million budget was funded by MassDOT and NYDOT, with the balance provided by the Federal DOT agencies.

As important was the data contributed by all participants. All partners helped shape the survey, which was designed to serve the needs of every participant. State DOTs and metropolitan planning organizations saved money by using the Federally designed survey, and use of the Federal survey allowed combining of data gathered at national, State, and city levels. Sharing data provided the participants with a larger sample than each funded—especially valued considering that the survey interviews cost about \$120 per household. In addition, the data obtained was collected by a reliable firm, thereby providing an authoritative source of information.

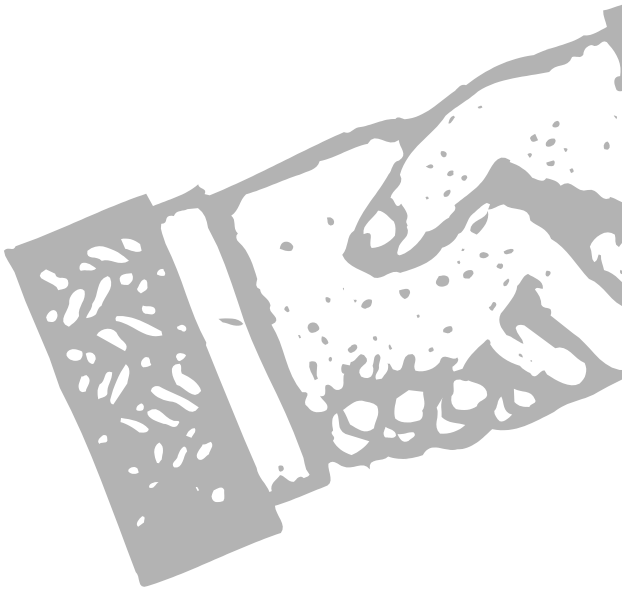
The 1995 survey—the fifth of its kind conducted since 1969—provides a comprehensive look at personal travel in the United States. The data gathered on the travel behavior of Americans is used to examine changing relationships among social and demographic factors, land development patterns, and transportation. Because the survey provides the only authoritative source for the characteristics of personal travel for the Nation, the information is used by a wide range of individuals and organizations, in addition to its use by the partners. These secondary users include universities, transportation researchers, medical doctors, car manufacturers, billboard advertisers, and other private industries that serve transportation markets.



GREATER THAN THE SUM OF ITS PARTS



**With a strong
alliance of
dedicated
partners,
anything is
possible**



Contributing Partners

A partial listing of the program participants follows. Although it is impossible to list all of the trade organizations, private companies, academic interests, and public agencies committed to a better highway system, their collaboration makes a difference far beyond what could be achieved individually.

Traffic Control Partnership Takes the Latest Technologies to the Road

AlliedSignal, Inc., Morristown, NJ
Automatic Signal/Eagle Signal Corp., Austin, TX
California Polytechnic State University, San Luis Obispo, CA
Lockheed Martin Corp., Bethesda, MD
PEEK Traffic, Tallahassee, FL
Siemens, Cupertino, CA

Coalition Applies Space Shuttle Technology to Develop Superior Skid-Resistant Coating

Alabama Dept. of Transportation, Montgomery, AL
NASA Marshall Space Flight Center, Huntsville, AL
United Technologies Corp., Hartford, CT
USBI Co., Huntsville, AL

WesTrack Team Combines Industry's Expertise and Resources for Pavement Research

Alcoa, Cleveland, OH
Detroit Diesel, Detroit, MI
Disc Lock, Culver City, CA
East Pennsylvania Mfg., Lyon Station, PA
Goodyear, Akron, OH
Granite Construction Co., Watsonville, CA
Harding Lawson Associates, Reno, NV

Huntway, Newhall, CA
Midland Grau, Kansas City, MO
Navistar, Fort Wayne, IN
Nevada Automotive Test Center, Carson City, NV
Nichols Consulting Engineers, Reno, NV
Oregon State University, Corvallis, OR
Roadtec, Daytona Beach, FL
Twin Disc, Racine, WI
University of California-Berkeley
University of Nevada-Reno

Leveraging Resources to Demonstrate the Latest Traffic Surveillance Technology

Georgia Dept. of Transportation, Atlanta, GA
Georgia Institute of Technology, Atlanta, GA

Industry Experts Connect on Bridge-Rehabilitation Research

Ashland Chemical Corp., Columbus, OH
BTI, Brunswick, ME
Creative Pultrusions, Inc., Alum Bank, PA
Owens-Corning, Toledo, OH
PPG Industries, Inc., Pittsburgh, PA
Reichhold Chemicals, Inc., Research Triangle Park, NC
Society of the Plastics Industry Inc./Composites Institute, New York, NY
U.S. Army Corp of Engineers
 CERL, Champaign-Urbana, IL
 CRREL, Hanover, NH
West Virginia Dept. of Transportation, Charleston, WV
West Virginia University, Constructed Facilities Center, Morgantown, WV

Trucking Industry Works to Electronically Link Its Information Systems

Applied Physics Laboratory, Johns Hopkins University, Laurel, MD
R.S. Information Systems, McLean, VA

Community Safety Programs Put the Brakes on Red Light Running

Cooper Tire & Rubber Co., Findlay, OH
Giant Food, Inc., Landover, MD
Wawa, Inc., Wawa, PA

Traffic Safety Partnership Helps You “Read Your Road”

National Association of Governors’ Highway Safety Representatives, Washington, DC
National Highway Traffic Safety Administration, Washington, DC

Industry Guides Research Toward Earthquake-Safe Bridges

Aerospace Corp., El Segundo, CA
California Dept. of Transportation, Sacramento, CA
Society for Advancement of Material Process Engineering, Covina, CA
University of California-Irvine

Traffic Safety Coalition Explores Advanced Technologies to Assist Law Enforcement

AT&T Wireless, Dallas, TX
College Station Police Dept., College Station, TX
Eastman Kodak Co., Rochester, NY
Epson, Austin, TX
International Association of Chiefs of Police, Alexandria, VA
Lucent Technologies, Dallas, TX
Motorola, North Brook, IL
National Highway Traffic Safety Administration, Washington, DC
Texas Dept. of Public Safety, Austin, TX

Texas Dept. of Transportation, Austin, TX
Texas Instruments, Dallas, TX
Texas Transportation Institute, College Station, TX

Native American Groups Solve Traffic Safety Problems Through Community Cooperation

Bureau of Indian Affairs, Washington, DC
Indian Health Service (Department of Health and Human Services),
Aberdeen, SD
National Highway Traffic Safety Administration, Washington, DC
Native American Injury Prevention Coalition, Bismarck, ND
North Dakota Dept. of Transportation, Bismarck, ND
Spirit Lake Dakota Nation, Fort Totten, ND
Standing Rock Sioux Tribe, Fort Yates, ND
The Three Affiliated Tribes, New Town, ND
Turtle Mountain Band of Chippewa, Belcourt, ND

Transportation Alliance Works to Ensure Safe Industrial Waste Reuse

Auburn Foundry, Inc., Auburn, IN
Indiana Dept. of Transportation, Indianapolis, IN
Indiana's Cast Metals Association, Indianapolis, IN
Purdue University, West Lafayette, IN

Common Vision Supports Team's Efforts Toward Safer Work Environment

Asphalt Institute, Lexington, KY
Barber-Greene/Caterpillar, De Kalb, IL
Blaw-Knox, Mattoon, IL
Cedarapids, Inc., Cedar Rapids, IA
Ingersoll-Rand/Champion, Chambersburg, PA
National Asphalt Paving Association, Lanham, MD
National Institute for Occupational Safety and Health,
Washington, DC

Roadtec, Inc., Chattanooga, TN
Thompson-McCully Co., Belleville, MI
U.S. Environmental Protection Agency, Washington, DC

Publication's Success Evidence of Mutual Commitment to Fly Ash Use

American Coal Ash Association, Inc., Alexandria, VA

Alliance Promotes Superpave Training and Technology Through Regional Centers

Asphalt Institute, Lexington, KY
Auburn University, Auburn, AL
North Central Asphalt User-Producer Group, Minneapolis, MN
Northeast Asphalt User-Producer Group, Pennsauken, NJ
Pacific Coast Asphalt User-Producer Group, Berkeley, CA
Pennsylvania State University, College Park, PA
Purdue University, West Lafayette, IN
Rocky Mountain User-Producer Group, Denver, CO
Southeast Asphalt User-Producer Group, Richland, MS
University of Nevada-Reno
University of Texas-Austin

National Industrial Alliance's "Communication Channel" Links Highway Authorities

American Concrete Pavement Association, Skokie, IL
American Road and Transportation Builders Association, Washington, DC
Clark Schwebel, Inc., Anderson, SC
Energy Absorption Systems, Inc., Chicago, IL
NACE International, Houston, TX
National Technology Transfer Center, Wheeling, WV
Tonya, Inc., Washington, DC
University of New Hampshire, Durham, NH

Concrete Seminars are Foundation for Solid U.S./India Industry Relations

Cement Manufacturers Association, New Delhi, India
Central Road Research Institute, New Delhi, India
Denton Construction Co., Grosse Point Woods, MI
India Concrete Institute, Madras, India
New York Dept. of Transportation, Albany, NY
University of New Hampshire, Durham, NH
W.R. Grace and Co., Boston, MA

Travel Demand Forecasting Interests Combine Efforts to Provide Training and Assistance

Federal Transit Administration, U.S. Dept. of Transportation, Washington, DC
Office of the Secretary, U.S. Dept. of Transportation, Washington, DC
U.S. Dept. of Energy, Washington, DC
U.S. Environmental Protection Agency, Washington, DC

Data Sharing Provides Transportation Partners With Comprehensive Survey Results

Bureau of Transportation Statistics, Washington, DC
Federal Transit Administration, Washington, DC
Massachusetts Dept. of Transportation, Boston, MA
National Highway Traffic Safety Administration, Washington, DC
New York Dept. of Transportation, Albany, NY
Oklahoma City Metropolitan Planning Organization, Oklahoma City, OK
Tulsa Metropolitan Planning Organization, Tulsa, OK