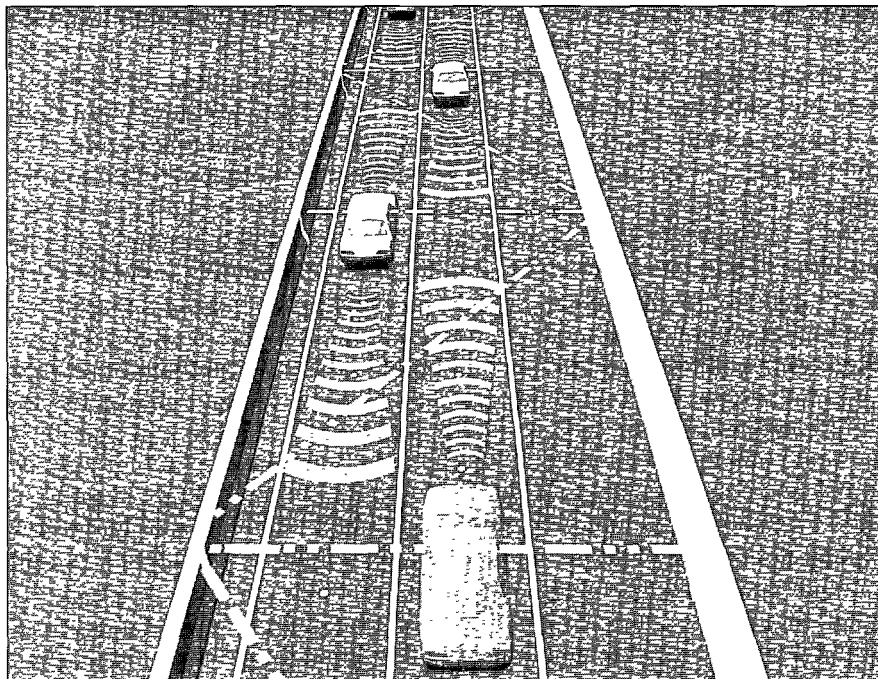




ITS

Automated Highway Systems Go Live at Demo '97



Technologies and prototypes on display at Demo '97 are being developed out of AHS futuristic designs like this.

Passengers of the Demo '97 scenario rides currently taking place on I-15 in San Diego are some of the first in the world to experience the range of automated highway system (AHS) technologies in a real-time/real-world setting — from driver assist modes to fully automated travel. Demo '97 is the National AHS Consortium Technical Feasibility Demonstration being held August 7 through 10, where transportation decisionmakers are tak-

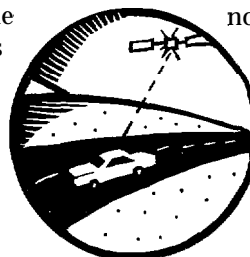
ing a look at the future of highway travel with a series of live demonstrations of AHS technologies. Demo '97 is showcasing these technologies by demonstrating their near-term applications to improve highway safety and efficiency, including several on-lane scenario demonstrations and a nearby exposition.

There will be six on-lane demonstration sce-

narios: (1) Free-Agent, Multi-Platform Scenario; (2) Platooning Scenario; (3) Maintenance Scenario; (4) Control Transition Scenario; (5) Alternative Technology Scenario; and (6) Evolutionary Scenario. The on-lane scenario rides are being given on the reversible high-occupancy vehicle lanes of I-15, using a variety of current model passenger vehicles. The rides show currently available and emerging advanced vehicle control and safety system technologies that will be the building blocks of an AHS prototype.

The exposition center details the potential benefits and near-term options of AHS technologies through exhibits, automated vehicle and equipment displays, computer simulations, vehicle demonstrations, presentations, and literature.

The use of AHS technologies should lead to improved safety by helping drivers detect and avoid obstacles and by communicating with other vehicles to enable coordinated maneuvering. AHS technologies will improve efficiency by reducing erratic acceleration, deceleration, and lane changing, and eliminate uneven traffic flow. — **Dick Bishop, (703) 2852680, dick.bishop@fhwa.dot.gov**



The *Research & Technology Transporter* is intended to transmit current research, technology accomplishments, and technical assistance information. It is issued under FHWA's Research and Technology Program. Editorial offices are housed at the Turner-Fairbank Highway Research Center. Comments and address changes should be sent to the editor at the address below. Field offices may submit articles for publication in the *Transporter* to the appropriate Research & Technology Coordinating Group (RTCG) Chairperson listed below. The *Transporter* is distributed to FHWA's Washington Headquarters and field offices, State highway agencies, and selected associations having direct involvement with FHWA and its highway research mission.

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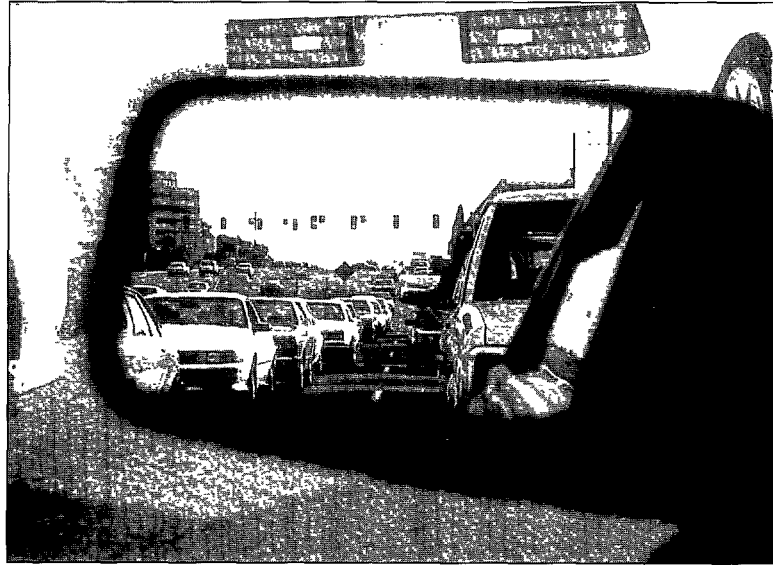
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Stopping Congestion in its RT-TRACS



RT-TRACS is an attempt to alleviate congestion.

FHWA is developing a system to improve traffic control by performing signal optimization in real time. The most fundamental requirement of this system is to effectively manage and respond to rapid variations in traffic conditions. To accomplish this goal, a system known as the Real-Time Traffic Adaptive Signal Control Strategy (RT-TRACS) is being developed and implemented jointly by FHWA and PB Farradyne. RT-TRACS is a concept that will eventually provide regional traffic control by operating various control strategies concurrently. RT-TRACS consists of a number of real-time control prototypes that each function optimally under different traffic and geometric conditions. When conditions dictate, RT-TRACS can automatically switch to another appropriate strategy.

Five prototypes are being developed and evaluated for use in the RT-TRACS program. Kaman Sciences Corporation is responsible for evalu-

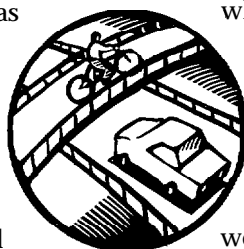
ating these prototypes. The CORSIM simulation model is being used to evaluate these prototypes in the laboratory. Three of these prototypes, the RHODES prototype from the University of Arizona, OPAC from PB Farradyne, and RTACL from the University of Pittsburgh, are at an advanced state of development.

The results of the laboratory evaluation of the RHODES prototype have indicated an improvement in delay, stops, and fuel consumption to the tune of 24 percent, 9 percent, and 6 percent, respectively, while maintaining the same throughput as the baseline case. A 16-intersection arterial in Reston, VA, has been selected for the field implementation, and instrumentation of the arterial is in progress. Based on the conceptual evaluation of the prototypes and the initial results of the laboratory evaluation, the field implementation is expected to be a resounding success. — **Jim Clark, (703) 285-268, jim.e.clark@fhwa.dot.gov**

SAFETY

Input from States Guides Roadside Safety Research

Input from a recent workshop held by the Safety Design Division is providing specific roadside safety target areas that could best be served and accelerated using advanced computer simulation techniques being developed by the Division. The simulation techniques are being used to augment the traditional



crash testing program, thereby reducing the costs and improving the range of conditions studied when developing or redesigning roadside hardware.

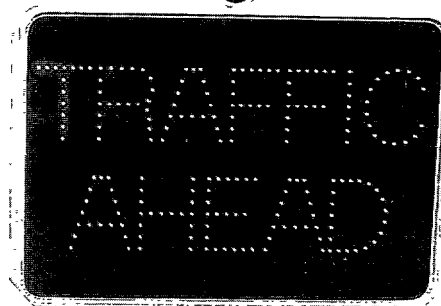
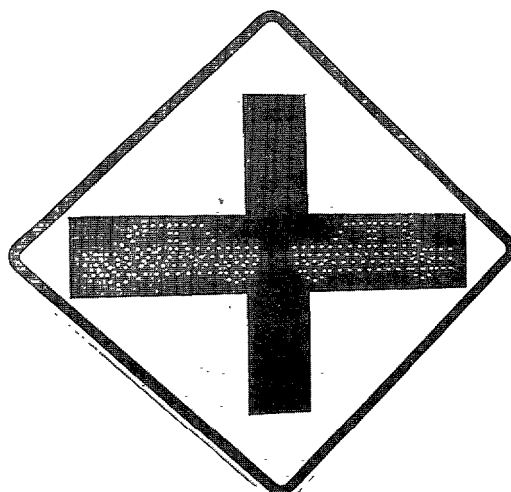
This valuable input was gathered from representatives of State DOTs and FHWA Regional Offices, as well as researchers from FHWA and the FHWA/NHTSA

National Crash Analysis Center. In his opening statement to the workshop, Jeff Paniati, Safety Design Division Chief, described this workshop as an integral part of the Division's efforts to enhance the quality of the FHWA safety research program and to improve communications between research staff and the end users. — **Leonard Meczkowski, (703) 285-2420, leonard.meczkowski@fhwa.dot.gov**

Collision Countermeasure System Installed

On August 25, a new dynamic traffic warning system will become operational at the intersection of Aden Road and Fleetwood Drive in Prince William County, Virginia. The system consists of an advanced intersection sign on the main roadway (Aden Road) that warns approaching drivers if traffic ahead is turning left. If a side-street vehicle is at the intersection, a blankout sign says TRAFFIC AHEAD and shows a vehicle on one of the legs on the intersection sign.

For the side street (Fleetwood Drive), a sign is mounted to show when a main-street vehicle is approaching the intersection and in which direction. The sign says CROSSING TRAFFIC and has a vehicle that appears to be moving below the legend when a vehicle is approaching.



This sign is being installed as an additional safety measure at an intersection in Virginia.

The intersection has poor sight distance and, although the speed limit is 60 km/h, vehicles on the main road travel at relatively high speeds making it dangerous to cross.

Traffic loop sensors were installed on both roadways to detect when traffic is present, and a controller was installed at the intersection to operate the system. The evaluation will include conflict counts before and after the signs are installed. The loop-information and sign-activation data will automatically be collected by the system.

This system should prove to be very successful. It may offer another method for improving safety at intersections. — **Howard Bissell, (703) 285-2428, howard.bissell@fhwa.dot.gov**

FHWA Explores World Transportation Innovations



The USA Pavilion is where many new technologies were marketed.

FHWA representatives recently returned from the International Road Federation's 13th World Meeting held in Toronto, Canada, June 16-20. More than 2,000 delegates from industry and governments around the world were able to meet, share ideas and knowledge with leading international transportation experts, and discuss

common concerns and insights about the future of roads and transportation systems. The technical program addressed a full spectrum of international technology and management — from the movement of hazardous goods to the design of intelligent transportation systems.

Concurrent with the meeting was the Transportation Exposition, which showcased state-of-the-art products, services, technologies, and systems from around the world. FHWA coordinated and staffed the 500-m² USA Pavilion, tying into the conference theme, "Roads Enhancing the Economy, Sustaining the Environment." Visitors traveled the road within the exhibit to experience showcased FHWA/DOT-sponsored projects, technologies, and partnerships. Hands-on sample materials, demonstrations, and interaction with technical experts were complemented by a suite of multimedia presentations for indepth virtual experiences. A bridge made of innovative composite materials carried visitors through displays of transportation innovations in such subjects as the environment, planning, safety, pavement and structures technologies, intelligent transportation systems, training and technology transfer, and economic issues. — **Martha Soneira, (202) 366-8029, martha.soneira@fhwa.dot.gov**

Side Impact —The Good, The Bad, and The Ugly

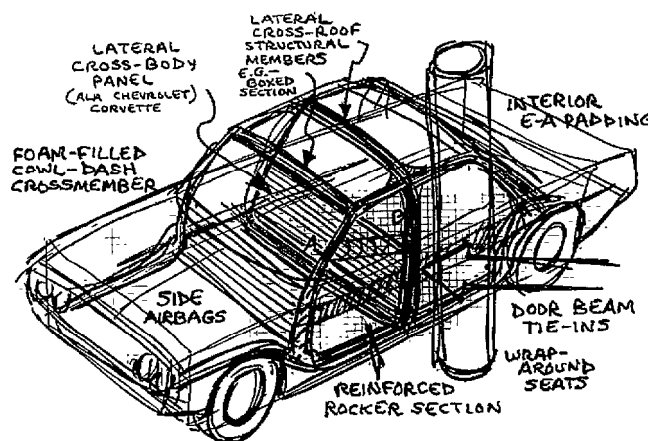
Showing some good, some bad, and some ugly automotive designs of the past, present, and future, Byron Bloch, a well-known consultant on auto safety design, gave a slide and videotape presentation on side-impact protection at the Turner-Fairbank Highway Research Center (TFHRC) in May. He showed how vehicle designs could be further improved to minimize intrusion into the passenger compartment. He stressed the importance of minimizing injury-causing pro-

trusions and rigid edges in the vehicle interior and pointed out new advances in technology, such as side-impact airbags, that would help reduce the severity of injuries.

FHWA is interested in side-impact protection because each year about 8,000 Americans are killed in side-impact crashes and tens of thousands are severely injured. Many of

these side-impact collisions are with roadside objects such as trees, utility poles, and guard-rail terminals. It has been estimated that the societal cost of side-impact collisions with fixed objects exceeds \$3 billion per year.

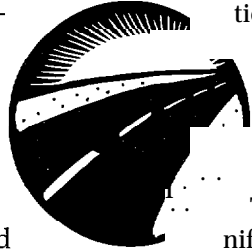
— **Charlie McDevitt, (703) 285-2418, charlie.mcdevitt@fhwa.dot.gov**



PAVEMENTS

R&D Award Winner Is Model of Excellence

Ray Bonaquist, Special Projects and Engineering Division, is the recipient of R&D's Outstanding Technical Accomplishment Award for 1996 for his paper, "A Comprehensive Constitutive Model for Granular Materials in Flexible Pavement Structures." This paper summarizes the results of a 5-year research program conducted in the Geotechnical Laboratory Complex of TFHRC to better understand and model the behavior of granular bases and subgrade soils. The research program used plasticity theory to produce a comprehensive constitutive (stress-strain) model for these materials. The



model that was developed is an extension of the effective stress principle and Mohr-Coulomb failure envelope commonly used in geotechnical engineering. It rationally considers both the resilient and permanent deformation response of granular materials and accounts for the effects of saturation and drainage. The model represents a significant advancement over current granular material models. It can be used to predict pavement performance, to select layer thicknesses to resist permanent deformations, and to select material properties to ensure adequate performance. To permit easy application of the model in practice,

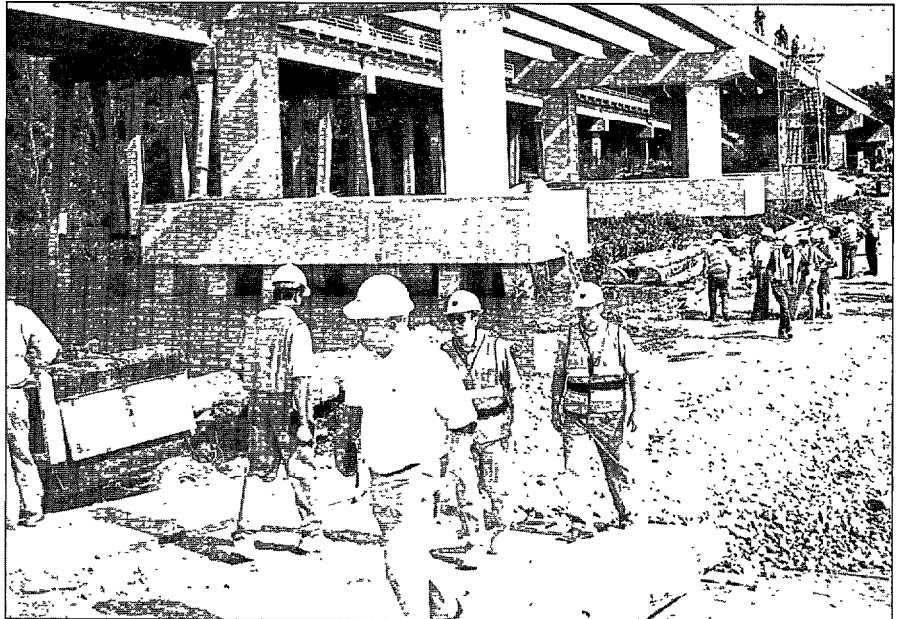
correlations between the model parameters and the internal friction of the granular material were developed. Only conventional triaxial shear strength tests are needed to apply the model.

Permanent deformation is the primary distress mode associated with supporting layers in flexible pavement systems. An approximate method for using the constitutive model to calculate permanent deformations was developed. This approximate solution was used to develop minimum cover thicknesses to limit permanent deformations in supporting layers of flexible pavement systems. — **Roy Trent**, (703) 285-2440, roy.trent@fhwa.dot.gov

STRUCTURES

Strengthening Support for HPC

The third major Strategic Highway Research Program (SHRP) High-Performance Concrete (HPC) Showcase brought together a record number of interested attendees from private industry. More than one-third of the participants at the June showcase held in Richmond, VA, were from the private sector. In fact, more would have attended but Virginia DOT, FHWA, and the Virginia Transportation Research Council who were cohosts ran out of space 2 weeks prior to the event. There are two more SHRP HPC showcases; one is in Washington state, August 18 to 20, and the second in New Hampshire, September 22 to 23. — **Sue Lane**, (703) 285-2111, sue.lane@fhwa.dot.gov



Attendees explore an HPC bridge site near Richmond.

MOTOR CARRIERS

CVO Technologies Take to the Road



Jeff Lindely, Denny Judycki, and George Reagle join Jane Garvey at the Technology Truck ribbon cutting in June.

The concept of taking the technologies involved in intelligent transportation systems (ITS) for commercial vehicle operations (CVO) directly to the users was unique when it came to figuring out how to get the word out to the diverse community represented by CVO. Back in 1994, when the idea was first discussed, a handful of committed people from the Office of Motor Carriers' (OMC) ITS/CVO Division and the Office of Technology Applications (OTA) were the only ones to take the idea seriously.

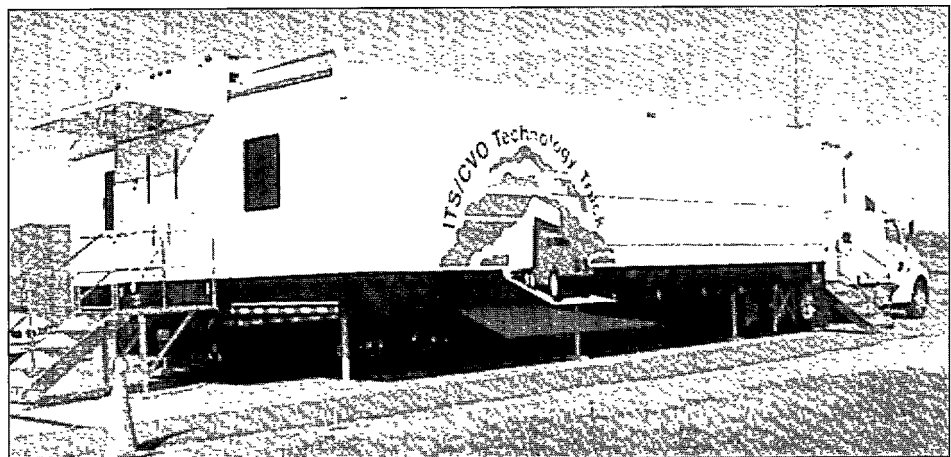
Three years later, that dream has become a reality — a reality built by a team of committed people who created a vehicle that will capture the attention of representatives from State enforcement and regulatory agencies, as well as the motor carrier community.

This team worked closely with 150 contributing partners on the concept, design, construction, and equipment installation for this project.

In June, Acting FHWA Administrator Jane Garvey officially cut the ribbon launching the DP-111 vehicle — better known as the ITS/CVO “Technology Truck” — on a 3-year tour of sites across North America. After seeing the Technology Truck firsthand, Garvey said, “This is a wonderful example of how the public and private sectors can work together with the CVO community on the valuable uses of ITS technologies.”

The Technology Truck is an over-

the-road tractor — donated by the Ford Heavy Vehicle Division — pulling a 15-m trailer with expandable sides. The truck, which houses portable ITS technology, classroom-type facilities, interactive kiosks, and a driver-simulation area, is designed to educate State regulatory agencies, key decisionmakers, legislators, and motor carrier communities by demonstrating the technologies and benefits of the ITS/CVO program. “What makes this demonstration project so different from other demonstration projects is that we have created an interactive environment where the visitor will get a real sense of how various ITS/CVO technologies are integrated and can be of benefit to the CVO community,” said George Reagle, Associate Administrator for Motor Carriers. — **Zeborah English, (202) 366-0398, zeborah.english@fhwa.dot.gov**



The new CVO Technology Truck, with classroom facilities and interactive kiosks, is on its first tour until November.

POLICY

New Ideas and Requirements Lead to Revised Guide to Reporting Highway Statistics

The revised *Guide to Reporting Highway Statistics* provides a clear, concise explanation of the concepts behind FHWA's national statistical reporting system. It was issued in spring 1997 by the Office of Highway Information Management as a reference to the States in reporting highway statistical data to FHWA. The Guide provides instructions to State DOTs and/or departments of revenue.

A Guide to Reporting Highway Statis-

tics was first issued in 1979 to organize the instructions for various reporting forms and other related data needs that had been issued over a period of several years. The Guide was revised and reissued in 1982 and four times subsequently in an effort to reduce the burden of reporting highway statistics. This edition continues previously established reporting requirements, with the addition of minor modifications and clarifica-



tions to some forms and instructions. The reports covered in this Guide are used to support the "Conditions and Performance Report" (required by 23 U.S.C. 307(e)), the apportionment of Federal-aid funds to the States; reauthorization analysis; and other key planning, programming, budgeting, and forecasting work. —**Marsha Reynolds, (202) 366-5029, mausha.reynolds@fhwa.dot.gov**

INTERNATIONAL

Cooperation Helps Create International Recycling Report

FHWA's Office of Engineering R&D played a major role in the publication of a new Organisation for Economic Co-operation and Development (OECD) roadway recycling report. *Recycling Strategies for Road Works* presents the status of recycling for road construction and rehabilitation, and assesses the use of by-product materials and waste management and recycling policies in OECD member countries. This new report builds on OECD's 1977 publication, *Use of Waste Materials and By-Products in Road Construction*, which helped establish recycling of waste and by-product materials.

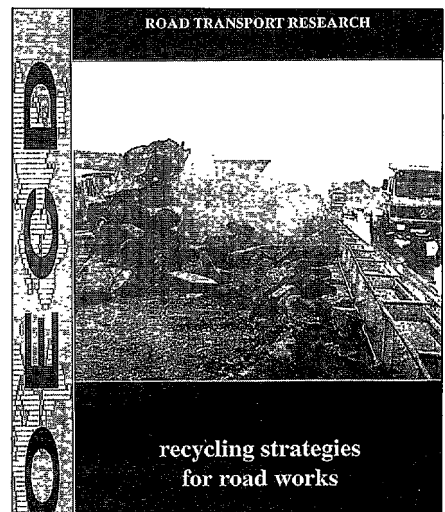
In 1995, OECD formed a Scientific Expert Group whose goal was to generate information that would promote recycling of waste

and by-products from roads and road building. Charles J. Nemmers, Director of the Office of Engineering R&D, was appointed president of the group. Over the next 18 months, the group members conducted surveys, gathered information, and met to identify and assess workable technologies (winners) and provide information on each technology including specifications for its use.

Lou Colucci and Marcia Simon from the Special Projects and Engineering Division provided technical oversight and international work flow management needed to develop the final report in short order. Most of the work that created the report was done through electronic transfer of files and data, along with maintaining e-mail contact with the technical editing commit-

tee. Transmittal of files from Japan and Europe to the editing group at TFHRC became standard practice.

The report was accepted by OECD for publication. The report is available through OECD publication channels (www.oecd.org). —**Marcia Simon, (703) 285-2069, marcia.simon@fhwa.dot.gov**



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Concrete Testing Trailer Goes to South America

When an FHWA concrete testing trailer became available as surplus inventory, several offices in the agency and private sector partners in the United States and Argentina pitched in to rehabilitate the vehicle for use in South America. This mobile concrete testing laboratory will help enhance the quality control process in concrete pavement construction and maintenance in Argentina, Chile, and Uruguay.

With funding from the Office of International Programs and the Pan American Institute of Highways, the FHWA truck was shipped to Argentina where it was refurbished. New concrete testing equipment was loaned or donated by several U.S. firms, including Troxler Electronic Laboratories; Gilson, Inc.;

Humboldt Manufacturing Co.; and Spa Steel Products.

The Argentine Portland Cement Institute is the trailer's sponsor, and is paying for the engineers traveling with the truck. In May, the trailer was demonstrated at Fematec, a huge construction materials trade show in Buenos Aires attended by 110,000 people. After Fematec, the truck was driven 1000 km to San Juan, Argentina, for a road maintenance training program, Provia, sponsored by the

Pan American Institute of Highways. There, nearly 200 transportation professionals from several Latin American countries learned about the trailer's capabilities. Next, it will be visiting Uruguay, then Chile. — **Tere Franceschi**, (202) 366-9775, c.tere.franceschi@fhwa.dot.gov



A revamped trailer prepares to leave Fematec.