

SPARKING INNOVATIVE TRANSPORTATION SOLUTIONS

Issue 11
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HIGH-SPEED RAIL
HIGHWAY SYSTEMS
TRANSIT &
TRANSPORTATION SAFETY

Ignition

News from TRB's IDEA Programs



INSIDE:

- Helping Seniors Arrive without Driving
- IDEA Technology Sold in China



TRANSPORTATION RESEARCH BOARD
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Ignition

News from TRB's IDEA Programs

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"THE WORLD'S FIRST NEW DRIVER... (FROM) 'DRIVER'S SEAT' FILE TO THEM"

THE IDEA PROGRAMS

Innovations Deserving Exploratory Analysis

IDEA programs provide start-up funding for promising but unproven innovations in surface transportation systems. The programs' goal is to foster ingenious solutions that are unlikely to be funded through traditional programs.

Managed by the Transportation Research Board, IDEA programs are supported by the member state departments of transportation of the American Association of State Highway and Transportation Officials (AASHTO), the Federal Transit Administration (FTA), the Federal Railroad Administration (FRA), and the Federal Motor Carrier Safety Administration (FMCSA).

The Transit IDEA program, which receives funding from FTA as part of the Transit Cooperative Research Program, is guided by a panel chaired by Fred Gilliam, President/CEO, Capital Metropolitan Transportation Authority in Austin, Texas. Harvey Berlin is the TRB program officer.

High-Speed Rail IDEA is funded by the FRA as part of its next-generation high-speed rail research. A committee chaired by Mike Franke, National Railroad Passenger Corporation, has oversight. Charles Taylor is the TRB program officer.

The NCHRP Highway IDEA program is supported by the member state departments of transportation of AASHTO through the National Cooperative Highway Research Program (NCHRP). It is guided by a panel chaired by Carol Murray, New Hampshire DOT; Inam Jawed is TRB program officer.

Safety IDEA is jointly funded by FMCSA and FRA. The committee is chaired by Ray Pethtel, Virginia Tech Transportation Institute. Harvey Berlin is TRB program officer.

Visit the IDEA web site:

www.trb.org/idea

On the cover: Photo of volunteer driver Martha Giles taken by Stewart Smith Photography, courtesy of ITN America®



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From the **Editor's** Desk

Paul McCartney, the 'cute Beatle,' turned 64 recently. Long ago he famously wondered if someone would still need him and feed him when he was 64, as though that age was a mark of advancing decrepitude. I scoff—everybody knows that 64 is the new 44. I do concede, however, that at some point, as we become the senior members of our society, it's likely that we will need to make changes in how we navigate our world. Fortunately, a model is in place. Eleven years ago, the Transit IDEA program funded a pilot project for an especially determined investigator looking for alternatives to driving for older people. In the Insight feature of this issue, we learn the story behind the Independent Transportation Network and how near-tragedy gave rise to an innovative transportation service that enhances the community it serves and improves safety.

Safety at highway-rail grade crossings is the focus of a High-Speed Rail IDEA project described in the New Ideas Section. Burlington-Northern Santa Fe Railroad participated in testing this new sensor system that could help reduce the death rate at dangerous intersections of road and rail. Also in this section, you can read about a new, non-nuclear device for controlling soil compaction based on measuring soil modulus. Arrangements with a manufacturing partner are already in the works. And new developments in an automated pavement condition survey method take a high-tech approach to an old problem.

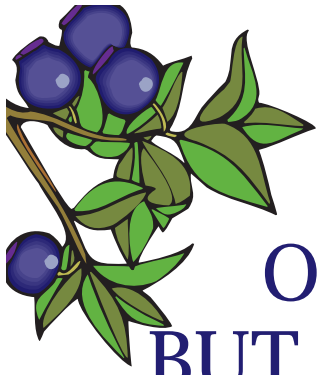
Speaking of high-tech, the Business section describes a scanning technology that reveals ungrouted sections of bridge ducts that is already on the international market.

For investigations funded through the IDEA programs, each innovation is an advance, each advance a success in some way, and each success a reason to reinvest. I hope that you'll invest a few minutes and read on.



Linda Mason
Communications Officer
Transportation Research Board
of the National Academies

Your comments are welcome and may be sent to the editor at: lmason@nas.edu



K. Freund

OUT OF THE DRIVER'S SEAT, BUT STILL STEERING THE COURSE

HELPING AMERICA'S SENIORS ARRIVE WITHOUT DRIVING

In America, the car has long been a symbol of that most American attribute, the spirit of independence. Whether celebrated in song or denigrated during rush hour, the car seems intrinsic to our sense of personal freedom and even to the perimeters of our personal space. The opportunity to hop in behind the wheel and head out on the highway feels like a cherished birthright. But for those who first got their drivers license in the 1950s and 1960s, and there are millions of us, the time to consider when not to drive may not be far away. What then?

That subject has become a mission for one former IDEA investigator. In 1995, Katherine Freund won funding through Transit IDEA Project 9 to test her concept for a program in which older drivers could remain independent if they stopped driving, even if they lived where public transit was inconvenient or didn't exist. In that early work, IDEA funding helped provide for needs assessments, focus groups, surveys, and a 3-month, 2-car pilot program called the Independent Transportation Network (ITN). A follow-on IDEA project (Transit IDEA Project 18) tested payment options and the use of geographic information system technology for routing trips.

Sustaining Dignity

Today, Freund is Executive Director of ITNAmerica®, a program that provides car and driver at any time of the day or night for people 65 years and older. ITNAmerica is a national nonprofit transportation network that aims to improve community safety by offering an alternative for seniors who don't or shouldn't drive. The organization grew from Freund's pilot project in Portland, Maine, where about 1,000 people now regularly use the local ITN. Communities in California, Florida, New Jersey, and South Carolina are launching networks using the model and the software developed through ITN. The Federal Transit Administration has partnered with Freund and other agencies to encourage national implementation of what it has called a model for sustainable, non-profit transportation for seniors.

From the beginning of the project, Freund's goal was to identify an alternative to driving that older people would find attractive and that closely approximated what they were giving up. Not surprisingly, people viewed transportation options as being closely related to their sense of independence and dignity. According to the people Freund surveyed and interviewed, retaining these characteristics meant they did not have to ask for favors, use public tax dollars, worry about having cash for every trip, travel in crowds, or make their way to a central pick-up point. The challenge, then, was to create a system that served a growing need for affordable transportation alternatives, to design the system around the preferences of those it would serve, and to somehow pay for it all. How the ITN pulls off the surprising trick of sustaining itself reminds us that transportation has a role in making connections in more ways than one.

Sweet Rewards

In Portland, for an annual ITN membership fee of \$35, seniors and people of any age with visual impairments can have a car and driver available anytime for any reason. The ITN is a cashless system, so a prepaid account is created for each rider and a monthly statement details account activity. Rides cost \$2 a mile, but trips booked in advance save \$1 a mile and sharing the ride with another member saves 15%. The average trip costs about \$8.00. These fees cover slightly more than half the operational costs of the ITN.

How the remaining costs are met offers a lesson not only in creative financing, but in what it means to be a community. A number of practical programs encourage contributions from various sectors of the community. Local shop owners, supermarkets, and shopping malls keep their senior customers coming in by contributing to a Ride and Shop program that is integrated into the ITN software so that no stamps, stickers, or paperwork are required. Doctors, dentists, therapists, and other health providers who depend on seniors for business can con-

The FTA...
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for seniors.

tribute to a Healthy Miles program that ensures patients can keep their appointments.

Other income takes the form of gift cards purchased by family and friends of ITN members, a particularly popular option. Family members can also purchase memberships to support the program. An annual walk-a-thon called March of the Members is held each spring as a fundraising event. The Road Scholarship program is a way to help low-income seniors pay for rides. Volunteer drivers, working when they want to, can earn transportation credits that can be donated to members or banked for their own future use. In other programs, churches, assisted living facilities, and libraries can contract with ITN to provide services for their members. In an option with a rewarding sense of symmetry, seniors may donate the cars they will no longer be driving and establish a transportation account worth the value of their car.

Keeping seniors connected to transportation through the ITN builds links across the community. In Portland, it can even provide dessert: a current promotion promises a homemade blueberry pie for each new volunteer driver.

A 19th Century Model for a 21st Century Challenge

Looking back on the success of her idea, Katherine Freund realized that what seemed new had actually been done long before. Both the YMCA (est. 1851) and Goodwill Industries (est. 1902) were models for national nonprofit organizations with local branches providing a paid service that is supplemented by local support. Freund believes that ITN can become viable nationally because of that proven business model and the software that ITN has developed to schedule rides and run the program. Not everyone would be convinced that a business model in which money is lost on every ride is still a successful venture. But running a transportation service is only half of the operation. The other half is a community outreach organization that gathers the volunteers, resources, and community connections to sustain the service.

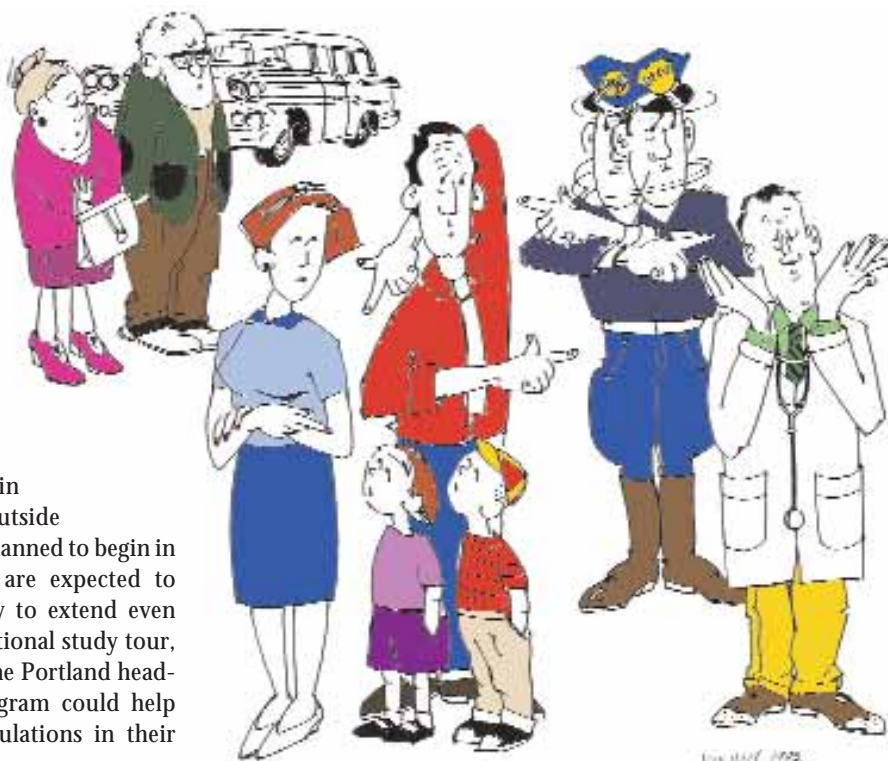
Hometown Trauma Yields International Impact

Phase one of a national rollout of ITN began in 2005 with the first four communities outside Portland establishing programs. Phase two is planned to begin in 2008 when an additional 30 communities are expected to become affiliates. The network idea is likely to extend even beyond U.S. borders. During a recent international study tour, delegates from Bermuda and Ireland visited the Portland headquarters of ITNAmerica to learn if the program could help address transportation issues for aging populations in their countries.

In the United States, the 65-and-older age group is the fastest growing segment of the population. As people born at the beginning of the 'baby boom' turn 60 this year, it's clear that will continue to be true for some time to come. According to the National Center for Injury Prevention and Control, drivers 65 years and older have higher crash fatality rates per mile driven than all but teen drivers. (<http://www.cdc.gov/NCIPC/factsheets/older.htm>)

Eighteen years ago, Katherine Freund was a young mother cradling her 3-year-old son in the street where he had just been hit by a car. The driver was 84 years old. After her son recovered, Freund began a graduate program in public policy hoping to find a way to help older people stay mobile and improve safety for everyone. Last year, she met in Washington with other Presidential appointees to the White House Conference on Aging to make recommendations to the President and Congress on policies regarding older persons. Her persistent pursuit of a solution has taken her a long way and we're pleased that the IDEA programs were there to help at the start of the Independent Transportation Network. ♦

For more information, contact ITNAmerica by email at info@itnamerica.org, by telephone in Maine at 207-857-9001, or visit them online at www.itnamerica.org.



"I'M WORRIED ABOUT THEIR DRIVING... I THINK YOU SHOULD TALK TO THEM."



New Ideas

Sensors for Safe Crossings

There are more than 250,000 places in the United States where roadways cross railways. The Federal Railroad Administration reports that, on average, there is a death a day at these highway-rail grade crossings. Happily, in 2005 the number of such fatalities declined by 3.5 percent and the FRA is actively looking for ways to keep improving safety at grade crossings and throughout the railroad system.

High-Speed Rail IDEA project 53 is testing a sensor technology that could help their search considerably. The sensors consist of a silicon wafer clad in a thin film of nickel-iron alloy. When exposed to the earth's magnetic field (or any other magnetic field, for that matter), the electrical resistance of the alloy registers changes in the local field, for example, the nearby movement of a large ferrous metal mass, such as a locomotive or a highway vehicle. Such a sensor could be used to activate grade crossing warning systems after detecting the location and

speed of trains and to detect incursions on or adjacent to the track and in the right-of-way.

The project tasks include selecting candidate sensors and testing them both in the lab and in the field. The tests have been conducted using cars, locomotives and rail cars, and Hi-Rail track maintenance vehicles. The tests, conducted at a grade crossing in a Burlington Northern Santa Fe rail yard, measured the sensor's ability to accurately and reliably detect both railroad and highway equipment. The tests confirmed the sensor's ability to effectively detect trains approaching a crossing and rail and highway vehicles both in and adjacent to crossings.

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Photo of rail, vehicle, and pedestrian crossing by Andrew Blaszczyk



Measuring Modulus to Control Soil Compaction

Controlling soil compaction for projects such as building roadway bases and backfilling retaining walls is essential to limit the extent to which the soil will deform under stress. In NCHRP IDEA project 118, the investigator has developed a way to test compaction using a parameter that is directly related to design goals and that avoids the need for nuclear devices. The Briaud Compaction Device (BCD) measures soil modulus at the surface of a compacted layer, rather than soil density, to improve the processes for specifying, measuring, and controlling soil compaction in earthworks.

The BCD uses a bending plate resting on the ground surface as an indicator of the modulus of the soil below. If the soil is stiff, the plate does not bend much when 50 pounds of force is applied by the BCD operator, but it bends a lot if



the soil is soft. Within the range of soil stiffness where the plate bending is proportional to the soil modulus, the bending strain, measured with strain gauges fixed to the top of the plate, is used to obtain the modulus. An equation developed during the investigation and integrated into the BCD processor translates the force of the bending strain into the modulus. Results of field and lab tests show that the BCD can predict the modulus of the soil with reasonable accuracy.

In Project 118, the investigator will build a series of test units as research tools, incorporating new design elements and refining the design in response to field and laboratory testing. The prototype will be evaluated by a manufacturing firm and the final element of the project is to build a production unit that could be sold commercially.

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Pavement Distress Surveys at Highway Speeds

Efforts to automate the process of collecting data on pavement condition reflect the tedious and inexact nature of the work. For the most part, DOTs no longer rely on workers walking along a stretch of pavement to identify and record in a notebook the patterns of pavement distress. But most automated methods of data collection still require time-consuming and error-prone identification of stress types and locations back at the department facilities. NCHRP IDEA project 111 is testing the application of stereovision techniques to collecting and analyzing pavement data at driving speeds. In an earlier IDEA project, a vehicle was outfitted with two cameras, algorithms for pavement cracks, rutting, and roughness were developed and code was written for calibration, distortion adjustment, and other required functions.

In the current project, a new research vehicle has been constructed, using four digital cameras and the equivalent of 20,000 watts of lighting. The new configuration will provide 2600-pixel resolution of more than a thousand point heights across the pavement to reconstruct the transverse profile of the pavement with 3D characteristics. The newly equipped vehicle is expected to collect and analyze pavement data through 3D reconstruction at driving speeds. Such a system would substantially reduce the cost of pavement condition surveys, which when conducted with an adequately outfitted laser-based device would cost \$100,000 or more, not including vehicle costs. Hardware costs for the fully



developed stereovision system would be only several thousand dollars. Investigators plan to make the completed system available to the highway agencies through a commercialization agreement with WayLink Systems Corporation, which has a relationship with the University of Arkansas.

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Business

China is First Customer for IDEA Project

Steel tendons run through ducts in post-tensioned bridges to provide the tension that helps support the bridge. Filling the space around the tendons with grout keeps moisture out of the ducts and prevents the steel from corroding. But being certain that the grout completely fills the space, both during the initial injection and over time, is problematic. Investigators in NCHRP IDEA project 102 have recently gone to market with a technology to resolve that problem.

Yajai Tinkey and Larry Olson of Olson Engineering, Inc., developed a non-

destructive evaluation method using a combination of stress wave techniques to determine the condition of grout inside bridge ducts. A scanning technology that measures surface, shear, and compression sound waves also produces 3-D impact echo results, which helps in visualizing ungrouted spaces within the duct. Further work on the project will be done to improve synchronization of the scanner and to test its accuracy against other test methods.

Even without these refinements, Olson Engineering has sold four units to research

institutions and universities in China and eight state departments of transportation in the U.S. have used the scanner technology in their bridge projects. This innovation could soon be a resounding success.

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