

# SHRP 2 Tackles the Human Side of Reducing Crashes and Congestion

*Everyone agrees that the human factor is the largest contributor in collisions.*

“**W**hat are the strategies that will make a difference in the day-to-day lives of people, not just the states and industry?” From this and similar questions, the committee that conducted a study for a Future Strategic Highway Research Program developed the themes powering the new Strategic Highway Research Program, which is now up and running, with a dozen studies under way and 40 more soon to follow.

Administered by TRB in cooperation with AASHTO and FHWA, SHRP 2 is a targeted, short-term research program that integrates multiple fields of study to find new ways to reduce fatalities, injuries and congestion on our nation’s highways.

But what is SHRP 2 really all about? How is it different from the first Strategic Highway Research Program carried out from 1987 to 1993 and why does it hold the promise of fundamentally changing the way we plan, design, build, operate and use our nation’s highways?

For starters, SHRP 2 is not primarily about highway materials or new construction techniques, as SHRP was. The vision guiding SHRP 2 assumes the use of advanced materials and technologies but aims to maximize their value by exploring the complex issues surrounding the *human* side of building and using our highway system.

The committee that planned SHRP 2’s objectives was composed of leaders from public agencies, private firms, universities, and highway users associations, among others. They pooled their best ideas about the challenges facing our highway system today and in the next 50 years and discussed them with hundreds of other stakeholders across the country.

Susan Martinovich, director of the Nevada Department of Transportation, was a member of the committee that produced TRB Special Report 260, in effect the charter for SHRP 2. She is also the chair of AASHTO’s Standing Committee on Research and a member of the Oversight Committee for the entire \$150 million, six-year SHRP 2 program.

“We’ve gotten good on the technical side and continue to grow in it,” she says. “But what about the opportunities in the safety area, congestion, economic development, reliability—those hard-to-quantify areas?”

From these and similar questions came the committee's articulation of an overarching theme to guide SHRP 2: *providing outstanding customer service*. For the committee this meant meeting highway customer expectations by thinking in new ways about moving people and goods, and responding to the public's desire for greater environmental sustainability and more involvement in transportation decision making. It also meant accessing technologies and expertise not traditionally associated with highway engineering.

The *human* emphasis of SHRP 2 relates not only to highway users, those who drive passenger cars, trucks, and buses on the nation's 47,000 miles of Interstate highways, and 115,000 miles of other additional National Highway System roads and 3.8 million miles of other state and local roads. SHRP 2 investigators are also studying the behaviors, mindsets and interactions of those involved in designing, constructing and operating the highway system.

SHRP 2 is a revolutionary kind of transportation research in many ways, aimed at gaining insights that will have significant and innovative impacts on traffic congestion, highway fatalities and quality of life issues. Each of SHRP 2's thematic research areas—Safety, Renewal, Reliability and Capacity—has common objectives:

- Look at the highway system from various *customers'* perspectives—the driving public, freight operators, communities, state and local agencies, contractors, railroads, utilities, etc.
- Find ways for *people* to work together more effectively in planning, designing, reconstructing, operating and, yes, expanding the nation's highway system.
- Coordinate the efforts of *experts* as well as public and private *workers* involved in the highway system to help them apply more effectively the knowledge and technologies they already have.
- Go beyond traditional highway materials issues to exploit advances in *human factors* research, organizational theory, environmental science, data management, telecommunication technologies and many other sciences.

## **Safety—Understanding driver behavior in order to reduce highway deaths and injuries**

We must look for new and more effective ways to significantly reduce the annual number of people killed and injured on our highways (more than 42,000 fatalities and 2.5 million injuries in 2006). So say the transportation community, Congress and the public. This wide concern is reflected in the \$45 million dollars,



*...the largest  
coordinated safety  
program ever  
undertaken in the  
United States...*

40 percent of the total SHRP 2 investment, allotted to focus on safety.

"We made a lot of headway in the past 30 years doing research on vehicle safety and road safety," says SHRP 2 Chief Safety Program Officer Kenneth Campbell, a career traffic safety researcher. "With occupant protection strategies like seatbelts and airbags, we were often able to limit injuries once the crash occurred."

Preventing crashes, however, is another story, Campbell says: "Everyone agrees that the human factor is the largest contributor in collisions."

Studying how drivers behave to get to the bottom of why they have crashes has not been easy, according to Forrest Council, chair of the SHRP 2 Safety Technical Coordinating Committee. "In the past," he says, "the only objective way we could get at driver behavior was to read the police officer's description of the crash scene and then infer what had previously happened. But the officer wasn't there when it happened."

Now someone *will* be there. In the largest coordinated safety program ever undertaken in the United States, thousands of volunteer drivers will be monitored over approximately two years on a near-continuous basis. On-board condition monitors and video recording systems will collect extensive data on vehicle status, such as speed and direction; on driver inputs, such as braking, steering, accelerating and specific behav-

iors, such as cell phone use, that lead to driver distraction; and also on the roadway, surrounding traffic and environmental conditions.

When crashes and near crashes occur, this stored pre- and post-crash data will be an invaluable resource for cause and pattern analyses, and will help guide development of the next generation of crash prevention efforts.

“The more we know about driver behavior in particular circumstances,” Council says, “the more we can design particular treatments or countermeasures that can begin to reduce our collision rate and thus the number of deaths and injuries on our highways.”

## **Renewal—Rebuilding our roads to serve the 21st century**

Because the roads and bridges built during the creation of the Interstate system often lasted far longer than their design lives, the public has come to take them for granted and to have little patience for the disruption caused when they need to be rebuilt. This is the challenge that we have inherited from the highway engineering and construction successes of the 1950s and 1960s.

“The traveling public needs to know what we’re up against,” says Randell Iwasaki, chair of the SHRP 2 Renewal Technical Coordinating Committee and chief deputy director of the California Department of Transportation. “The infrastructure is aging and, all too often, has outlived its design life.”

To rebuild our aging infrastructure on a massive scale will require new and dramatically improved approaches. “Our commitment,” says Iwasaki, “is to find ways to rapidly rebuild the system with long-lived facilities and minimal disruption: get in, get out, stay out.”

Some of the research scheduled for the Renewal focus area involves technology: better and faster nondestructive testing; prefabricated, modular, standardized and roll-in components; and high-speed construction inspection. All to minimize the time motorists are inconvenienced. Another Renewal tactic addresses integration of materials selected for use with construction technologies—to create facilities that are much easier and less costly to maintain.

Much of the research, however, focuses on human factors, on the contractors who are rebuilding the infrastructure. “We want to find ways to transform the contracting environment,” says Robert Raab, senior program officer for Renewal, “to make innovation something that’s encouraged, where contractors don’t have to assume all the risk for trying something new.”

Once new approaches are developed and validated, SHRP 2 will produce guidelines for state transportation agencies to help them adopt these new practices, overcome internal and external resistance, and convey to the public the benefits of coordinated, streamlined reconstruction projects.

## **Reliability—Finding ways to put highway operations front and center**

State DOTs are often asked to make the highways we already have work better in getting people where they want to go on time. That’s one way of expressing the goal of the SHRP 2 Reliability focus area: learn how to get more traffic through the existing system on a more consistent basis.

John Conrad, chair of the Reliability Technical Coordinating Committee and former chief engineer and assistant secretary at Washington State DOT, says, “One of the biggest problems we have is that improving highway operations hasn’t been put on the same level as capital improvements. It’s really hard to make the case to invest more in operations unless you can show the benefits that you should be spending a lot of money on operations.”

To demonstrate the big payoff that can come from heightened improved traffic operations, especially on urban freeways, SHRP 2 investigators are looking at proven successes; for example, new techniques for managing traffic. How can similar techniques be applied to weather, work zones, special events and other incidents that disrupt traffic flow, cause congestion and reduce the reliability of the highway system?

The human component again is a focus of the research. How can traffic management centers, police and fire personnel, and emergency medical responders work together more effectively at a crash scene? They’re often from different agencies or different work units within an agency—what would help them work together seamlessly, with dividends in improving reliable travel times and in safe arrivals?

Reliability focus area research projects will look at both proven and newly developed ways to anticipate and quickly clear traffic interruptions. Systematic improvements in traffic management could mean highway users could allot less extra travel time to account for uncertainty, more reliable travel times and increased throughput that equates to added capacity.

SHRP 2 investigators are developing metrics to help agencies directly compare operations improvements vs. new construction.





“Our current planning and programming models don’t take operations into account, so we can’t compare the relative benefits of capital investments vs. operations investments,” says Conrad. “The research will also investigate how highway design elements influence and improve operations.” How do we incorporate highway design issues like geometrics into operations?”

“In the end,” says Reliability Senior Program Officer William Hyman, “SHRP 2 Reliability research will provide tools for better managing the needs of highway users, whether they’re travelers or dispatchers or state agencies. One of those tools should be a new vocabulary and the corresponding operations and management techniques to address unpredictable interruptions to traffic flow.” Reduce travel time variation and you reduce congestion—just by improving the way you operate the highways.

## **Capacity—Planning new roads with everyone at the table**

Despite tremendous strides in more effectively operating existing highways and much greater use of transit and other transportation modes, the nation still needs to expand highway capacity dramatically in the next 50 years. AASHTO’s New Vision for the Future calls for an 80 percent increase in Interstate capacity by 2055.

So how do we build new highways in the face of public concerns about the environment, economic impacts, land use and effects of new roads on their communities?

“It’s no longer business as usual when it comes to building new roads,” says Stephen Andrie, SHRP 2 chief program officer for the Capacity focus area. “The days of ‘design and sell’ are gone. The public and a whole range of stakeholders need to be at the table as decision makers.”

To achieve this goal, SHRP 2 Capacity focus area investigators are studying collaborative decision making—a *human* side of transportation research if there ever was one.

Neil Pedersen, chair of the Capacity Technical Coordinating Committee and administrator for the Maryland State Highway Administration, explains it this way: “The Capacity track of SHRP 2 is aimed at developing and documenting proven methods of delivering highway projects in a more timely manner, getting stuck projects approved, and carefully examining the broader planning-related issues—the economic issues, the environmental issues, the community issues and how they all relate to the delivery of highway capacity.”

SHRP 2 Capacity investigators are looking at ways to reestablish the connection between the public and economic considerations—how improved transportation systems enhance regional economic vitality and land values.

“The public no longer has a feel for the importance of highways to their lives,” Andrie says. “Goods just show up at stores. People don’t make the connection to the highway system. We need to develop clear, transparent ways of demonstrating that improving the highway system is in their interest.”

“SHRP 1 focused on the hard side of highway construction,” Pedersen says. “But now the major areas of concern for those of us who administer highway programs are not just building new projects. We also need to focus on rehabilitation or reconstruction of roads—under traffic. We have to maximize the efficiency of the systems we already have for doing this work. And we still haven’t made a dent in reducing highway fatalities. SHRP 2 is about all of these things—Capacity, Renewal, Reliability and Safety. It’s truly addressing the most strategic challenges.”

*We want to find ways to transform the contracting environment . . . where contractors don’t have to assume all the risk for trying something new.*

## **Putting it all into practice**

The first SHRP 2 research projects will soon begin to yield results—unprecedented new data on the human causes of crashes, truly innovative highway reconstruction approaches, creative human and technological solutions to providing reliable travel times on urban freeways, and truly collaborative approaches to building new roads.

SHRP 2 is also integrating into its work the advances already achieved in the four focus areas by existing research programs, such as NCHRP, and by other countries. International organizations are being informed and engaged through the use of

loaned staff and collaborative efforts.

How will all of this valuable new knowledge be applied?

“We have to lay out a plan for putting SHRP 2 research into practice,” says Kirk Steudle, chair of the Implementation Committee and director of the Michigan Department of Transportation. “We’ll be submitting an initial report in early 2009 on how to get started and how results will be communicated to the states, at this early stage and throughout the remaining life of SHRP 2.”

In the end, the success of these implementation efforts will determine if SHRP 2 delivers on the promise of bringing fundamental change to the way we plan, design, build, operate and use our nation’s highways.

## **THE NATIONAL ACADEMIES™**

*Advisers to the Nation on Science, Engineering, and Medicine*

The nation turns to the National Academies—National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council—for independent, objective advice on issues that affect people’s lives worldwide. [www.national-academies.org](http://www.national-academies.org)