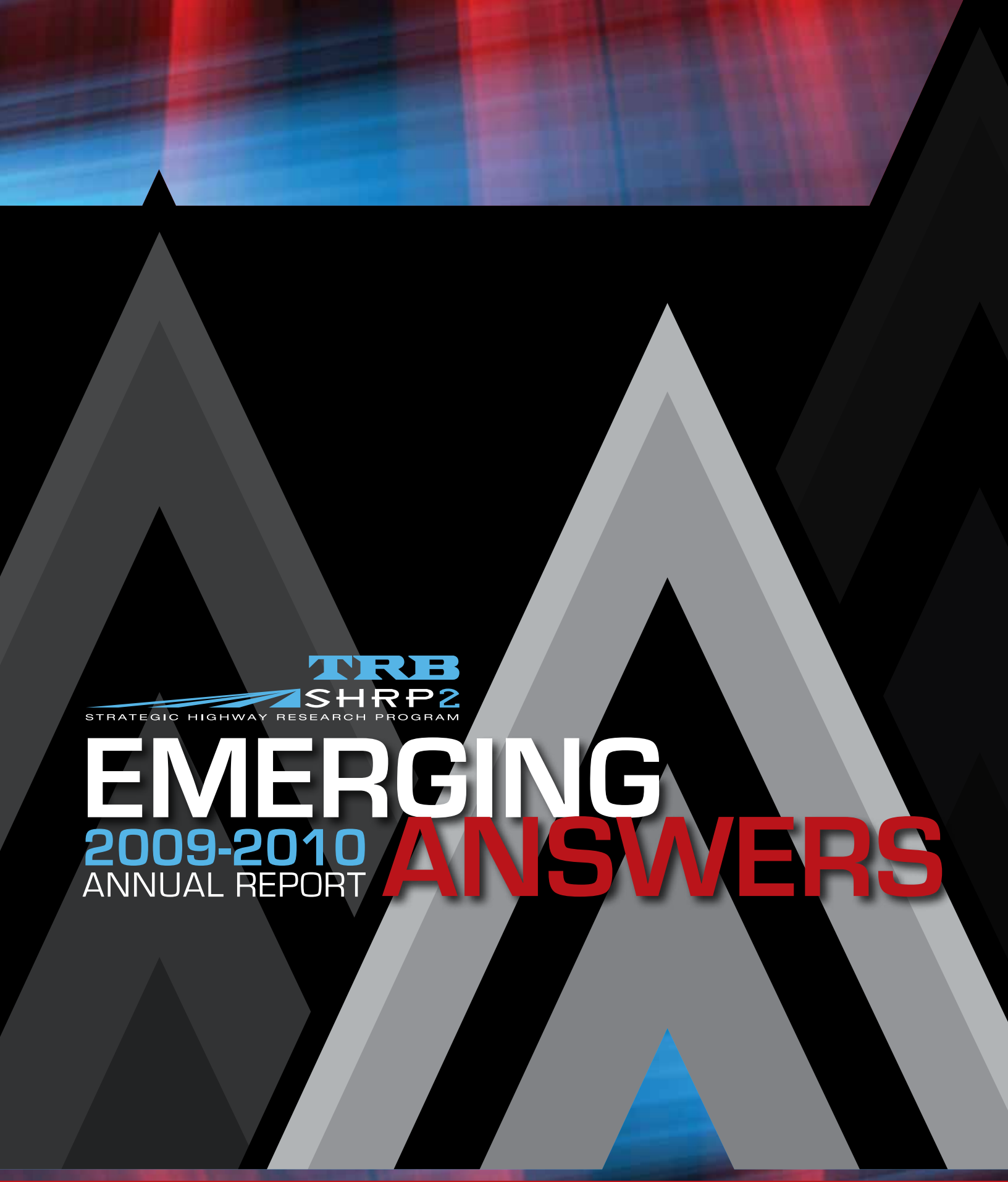

EMERGING ANSWERS

2009-2010 ANNUAL REPORT

THE SECOND STRATEGIC HIGHWAY RESEARCH PROGRAM
ACCELERATING SOLUTIONS FOR HIGHWAY SAFETY, RENEWAL, RELIABILITY, AND CAPACITY

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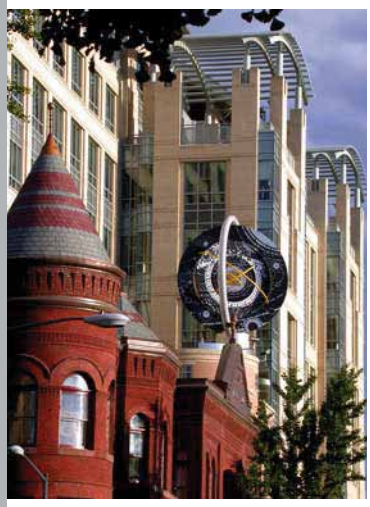
EMERGING ANSWERS

THE SECOND STRATEGIC HIGHWAY RESEARCH PROGRAM
ACCELERATING SOLUTIONS FOR HIGHWAY SAFETY, RENEWAL, RELIABILITY, AND CAPACITY

2009-2010 ANNUAL REPORT

TRB
SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

The Strategic Highway Research Program (SHRP 2)



America's highway system is critical to meeting the mobility and economic needs of local communities, regions, and the nation. Developments in research and technology—such as advanced materials, communications technology, new data collection technologies, and human factors science—offer a new opportunity to improve the safety and reliability of the nation's highway system. Breakthrough resolution of some significant transportation problems requires concentrated resources. The second Strategic Highway Research Program (SHRP 2) has an intense, large-scale focus, integrates multiple fields of research and technology, and is fundamentally different from the broad, mission-oriented, discipline-based research programs that have been the mainstay of highway research for half a century.

The need for SHRP 2 was identified in *TRB Special Report 260: Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life*, published in 2001 and based on a study sponsored by Congress through the Transportation Equity Act for the 21st Century (TEA-21). SHRP 2, modeled after the first Strategic Highway Research Program, is a focused, time-constrained, management-driven program designed to complement existing highway research programs. SHRP 2 focuses on applied research in four focus areas, which were selected on the basis of their importance to the nation's economy and quality of life, and because strategically targeted research in these areas promises to yield high payoffs. The focus areas are: Safety, to prevent or reduce the severity of highway crashes by understanding driver behavior; Renewal, to address the aging infrastructure through rapid design and construction methods that cause minimal disruptions and produce lasting facilities; Reliability, to reduce congestion through incident reduction, management, response, and mitigation; and Capacity, to integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity.

SHRP 2 was authorized in August 2005 as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program is managed by the Transportation Research Board (TRB) on behalf of the National Research Council (NRC). SHRP 2 is conducted under a memorandum of understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the National Academy of Sciences, parent organization of TRB and NRC. The program provides for competitive, merit-based selection of research contractors; independent research project oversight; and dissemination of research results.

SHRP 2 takes a customer-oriented view of highway needs, addressing them from a system perspective, is open to research in nontraditional highway-related areas, and explicitly acknowledges the interdependence of highway research and technology programs. Special emphasis is placed on disseminating SHRP 2 results to the intended end-users of the research, and many SHRP 2 products may be adapted as standards, guides, and practices at the local, state, or federal level.

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V.Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is one of six major divisions of the National Research Council. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied activities annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. **www.TRB.org**

www.national-academies.org

CONTENTS

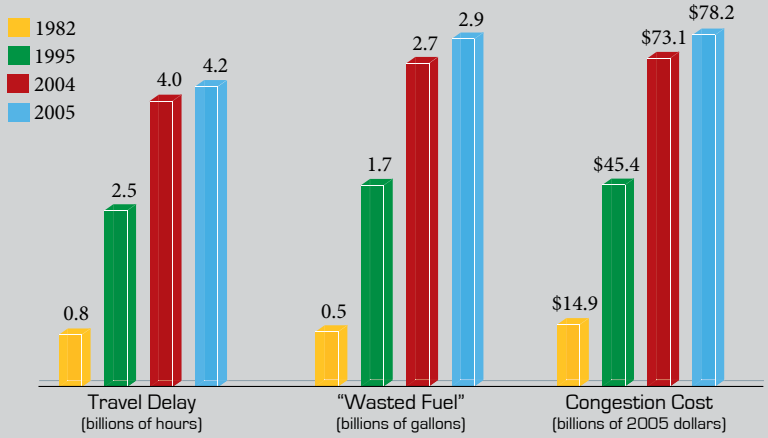
Note: Beginning this year the SHRP 2 Annual Report will cover activities that occur during our fiscal year, which runs from July 1 through June 30. The change was made to conform with other reporting requirements.

PREPARING FOR A NEW PERSPECTIVE

The Second Strategic Highway Research Program (SHRP 2) asks fundamental questions about critical transportation issues. Now, four years into the program, answers to those questions are emerging, giving shape to new tools and resources and reaffirming that our national transportation goals are not separable from each other or from our desire for thriving communities, a strong economy, and balanced natural environments.

Highway congestion, for example, is a critical transportation issue. Not only is congestion frustrating to drivers, it affects our personal safety (the risk of a secondary crash increases 3% for every minute of incident delay) as well as national environmental and economic factors. Congestion is expected to increase in line with the anticipated 40% growth in U.S. population by 2050.

Answers now emerging from SHRP 2 research indicate that opportunities to reduce congestion occur throughout the lifespan of highway projects and encompass not just technology, but institutional, human, and social factors as well. Products developing in each of the four areas of focused research contribute to reducing congestion at various points in the highway project process.



The U.S. Congestion Problem, from Texas Transportation Institute, published in *Transportation Vision 2030.* Research and Innovative Technology Administration of the U.S. DOT (January 2008).

For example:

- **WE CAN** speed planning, design, and delivery of highway improvements with effective models and tools for collaborating across agencies and enterprises.
- **WE CAN** speed construction and extend the life of roads and bridges by standardizing the use of innovative materials, techniques, and tools.
- **WE CAN** improve mobility with robust tools for strategically managing highway operations.
- **WE CAN** learn how to reduce crashes by understanding driving behavior, improving both safety and mobility and reducing congestion.

It may take a new perspective to recognize these opportunities that lie outside of traditional work flows, but as products of SHRP 2 research develop, the reasons to do so become increasingly compelling.

SHRP 2 has collaborated with research communities in Australia, Canada, China, Finland, France, Ireland, Israel, Italy, Slovenia, South Korea, Spain, Sweden, the Netherlands, and the United Kingdom and with international transportation research agencies such as the Forum of European Highway Research Laboratories, the Joint Transport Research Centre, and the European Commission.

Both the questions addressed in SHRP 2 and the emerging answers reflect the thinking of many knowledgeable transportation leaders and practitioners. More than 500 people with expertise in the research topic areas, including nearly 200 from state transportation agencies, serve as members of committees and groups that advise on the research and review its products. The program also benefits from the perspective and knowledge of leaders from related industries and from academia. Additionally, representatives of the Federal Highway Administration, the National Highway Traffic Safety Administration, and the American Association of State Highway and Transportation Officials are actively involved in the program. Eighty-one teams of researchers are hard at work to push through boundaries of knowledge and practice, and transportation leaders from a dozen other countries participate in various SHRP 2 activities.

In this report, readers will find early examples of developing products to help reduce crashes and congestion and to renew the highway infrastructure. The report also documents program activities and describes an evolving focus on pre-implementation activities during a pivotal year in this 7-year program. A list of research project titles begins on page 13.

ACTIVE STATUS OF RESEARCH PROJECTS *(July 2010)*

FOCUS AREA	ANTICIPATED	ACTIVE	COMPLETED	TOTAL
Capacity	4	15	2	21
Reliability	5	7	6	18
Renewal	0	22	6	28
Safety	2	4	8	14
	11	48	22	83

CRITICAL ISSUES, EMERGING ANSWERS, AND DEVELOPING PRODUCTS

Q: How can we renew the highway system with minimal disruption to traffic and communities?

Wrangling a precast section on Highway 62 in Minneapolis. *Photo by David Gonzalez, Minnesota DOT*

> "For the first time, SHRP 2 will give us the calculations we need to determine where we can spend upfront on superior materials and methods and achieve longer service life, and where we should choose to spread costs over time."
>
> —Bruce Johnson
> State Bridge Engineer,
> Oregon State DOT

Rapid renewal takes place while highway facilities are in service. That's why, across the United States, thousands of roadways and bridges that connect communities and support the flow of commerce must be replaced or renewed with the least possible disruption. How to accomplish that is a focus of SHRP 2 research. The emerging answers point to the need for advances that shrink the time spent in work zones. These include advances not just in construction methods, but in design, management, testing and inspection as well. Products to support that goal took shape this year and some are highlighted here.

A: **Develop rapid ground improvement techniques**

Developing products: An electronic catalog of geotechnical solutions, including materials and systems, design procedures, quality assurance and quality control processes, and methods for estimating cost (Renewal project R02, active). These products are being beta tested and should be ready for implementation in 2012. Prototype performance specifications will be part of the final delivery.

A: Design for service life

Developing products: Preservation strategies for high traffic-volume roadways (Renewal project R26 completed, report S2-R26-RR-1 and Guide S2-R26-R-2 in publication) A "Bridges for Life" guide to using innovative systems to construct bridges and their components that will last more than 100 years (Renewal project R19-A active, Guide content about 25 percent complete).

A: Advance technologies for inspection and testing

Developing products: A suite of eight projects are under way to improve nondestructive testing tools and methods: measuring uniformity of new hot-mix asphalt layers; identifying deterioration of concrete bridge decks and delamination between HMA layers; evaluating field spectroscopy, infrared, and high-speed ground penetrating radar devices; performing quality control of construction materials; and mapping voids, bonding, or moisture in tunnel linings (Renewal projects R06 and R06-A through G, all active).

A: Prefabricate offsite

Developing products: A toolbox for accelerated bridge design and construction, including standardized plans, details, design examples, model specifications for design and construction, and training materials (Renewal project R04, construction of a demonstration project will begin in late 2010). Advances in modular pavement technology, including design and construction guidelines, draft specifications, and a long-term research plan.

A: Make innovations standard

Developing products: Guidelines for managing risk on rapid renewal projects and training materials (Renewal project R09, completed); Design procedures for composite pavement systems (Renewal project R21, demonstration project constructed at MnROAD opened to traffic in June 2010); Model specifications and guidelines for measuring smoothness of portland cement concrete pavement in real-time during construction (Renewal project R06-E, active); Prototype performance specifications for rapid highway renewal (Renewal project R07, active); Strategies for planning renewal activities at corridor and network levels (Renewal project R11, active).

Q: How can we deliver transportation projects faster?

"I expect that this information will help our next major capacity project advance much more smoothly, helping us make decisions that hold, and keep us moving forward."

—Neil Pedersen, Administrator, Maryland State Highway Administration

Gains from advanced design and construction methods and new technologies can speed some project phases, but achieving significant reductions in the time it takes to deliver transportation improvements will require a new perspective on preconstruction phases. Emerging answers emphasize the importance of early collaboration and integration across project phases to avoid the conflicts and impasses that delay delivery of transportation solutions that meet community needs and serve broader ecological and economic goals. For several products with potential to speed delivery in the preconstruction phases, this year was one of significant progress. These products are highlighted on the following page.

A major transportation project can easily take 10 to 15 years from start to finish, even without controversial issues that can slow it down still further. A typical timeline for a major project might be:

- 2 to 3 years in planning, either as part of a long-range transportation planning effort or a corridor feasibility study,
- 4 to 6 years to address the National Environmental Policy Act (NEPA) requirements and produce a record of decision,
- 2 to 3 years for detailed design,
- 1 to 2 years for right-of-way acquisition and utility relocation, and
- 2 to 3 years for construction.

The schedule adds up to more than a decade.

(from *Transportation Invest in Our Future: Accelerating Project Delivery,* AASHTO 2007 http://www.transportation1.org/tif7report/tif7.pdf)

A: Collaborate on planning decisions

Developing products:

Transportation for Communities—Advancing Projects through Partnerships (TCAPP) is a web-based resource for collaborating at the right time and with the right people when making key decisions in planning highway capacity improvement projects. TCAPP will eventually deliver the results of more than a dozen research projects in the Capacity focus area. The current beta version includes: a performance measurement framework for decisions on capacity enhancement (C03); case studies in collaboration (C01); and a practitioner's guide to link community visioning to capacity planning (C08). The beta version of TCAPP was made available in January 2010, at www.transportationforcommunities.com.

A: Know what's underground

Developing products:

Tools for locating and characterizing underground utilities and for improving ways to collect and share 3-D data about them are addressed in four projects (Renewal projects R01 and R01A-C). The products include a web-based decision tool for selecting appropriate location technologies (the technology selection guide is in review, report S2-R01-RW is available on the SHRP 2 website), nondestructive testing tools for detecting and locating underground utilities and users manuals (due in 2012), guidelines for implementing a repository for 3-D data (due in 2012), and innovations in locating technologies for deep utilities (due 2012).

A: Coordinate with railroads and utilities

Developing products:

Model agreements for cooperation between DOTs and railroads, streamlined permitting procedures, and strategies for resolving policy issues (Renewal project R16 is completed, report S2-R16-RR-1 is in publication). A plan for testing innovative strategies for integrating highway and utility work (Renewal project R15 is completed, report S2-R15-RW is available on the SHRP 2 website) A web-based matrix for resolving utility conflicts in highway projects, along with training materials and a procedural manual (Renewal project R15-B, completion expected in 2011).

A: Integrate environmental goals with transportation planning

Developing products:

Web-based templates to help any group of involved parties assess and identify ecological priorities and strategies for success when planning transportation projects to increase capacity (Capacity project C06B completes in 2010 and will be available through TCAPP).

Guidelines for integrating conservation, planning, and environmental permitting into an ecosystem approach; model business plan and sample agreements for incorporating environmental concerns at the ecological scale in the early stages of transportation decision making (Capacity project C06A, completion in 2011, will be available through TCAPP).

Q: How can we reduce congestion?

> "Our 65,000 bus commuters tell us what is most important to them is not necessarily a fast trip, but a predictable one. The tools coming out of SHRP 2 will help us provide even more consistent and reliable service to our customers every day."
>
> —Mark Muriello, Assistant Director of Tunnels, Bridges and Terminals for the Port Authority of New York and New Jersey.

SHRP 2 addresses two types of roadway congestion: the predictable backups that occur when demand exceeds capacity, such as morning and afternoon commuting times; and the congestion that results from incidents, special events, work zones, messy weather, and other factors that can create traffic tie-ups at any point on the roadway at any time of day. Answers to how to reduce both types of congestion are emerging from three SHRP 2 focus areas. Tools to identify and reduce potential congestion that can be applied during transportation planning, design, and operations are in development. This year, significant progress was made in those products listed below.

A: Design for reliable travel times and long life

Developing products:

A compendium of road designs that can improve travel time reliability, along with an evaluation of their costs and effectiveness is in development (Reliability project L07, interim report due early 2011).

Structures designed to be rapidly installed and long-lasting reduce the frequency of road closures for renewal work, which reduces congestion. Renewal research will produce an array of products to help design and construct bridges and their various components to last beyond 100 years and to mainstream accelerated construction methods with model specifications. (Renewal projects R19-A completes December 2011, R19-B completes March 2012, and R04, completes October 2011).

A: Select tactical operational strategies

Developing products:

A guide to analyzing the impacts on travel-time reliability of various strategies to ease congestion has been developed and is in publication (Reliability project L03 completed, report in publication). Performance measures for operational strategies to improve travel time reliability and means to evaluate alternatives (Reliability project L11 completed, report in publication)

Web-based analysis tool for selecting management strategies that incorporate operations, technology, and design to address capacity needs (Capacity project C05, near completion).

A: Integrate highway operations with other agency functions

Developing products:

Both operational and institutional processes have great potential to benefit transportation network efficiency. Five projects will produce guides, analytic procedures, and other tools that agencies can use to improve highway operations. Two of these were completed this year and the products are in publication. (Reliability projects L01, completed; L04, due 2012; L05, due 2012; L06, completed; and Capacity project C05, due September 2010)

A: Plan for freight demands

Developing products:

A strategic plan for encouraging innovation and breakthroughs in freight demand modeling and data is in development, as are strategies for improving how freight demand is considered in transportation planning (Capacity projects C15 and C20, both due in 2011).

A: Cross-train incident responders

Developing products:

Core competencies for incident responders, a proposed curriculum, and a framework for national certification have been developed to improve safety, cooperation, and efficiency at roadway incident sites. Workshops held this spring to test and refine the training were enthusiastically received by participants and more are scheduled (Reliability project L12, completion December 2010).

A: Use advanced models to test alternative solutions

Developing products:

Public policy and investment questions require transportation modeling tools that are sensitive to the dynamic interplay between traveler behavior and actual operating conditions on the transportation network. Five projects in the Capacity area are developing products to address this need.

Advanced travel-demand models that can estimate motorist responses to transportation management strategies and public policy options (Capacity project C10A is being conducted by public agencies in Jacksonville, Florida; results will include a transit option. Public agencies in Sacramento, California, are pilot testing the network simulation and travel demand model in Capacity project C10B.)

Mathematical descriptions of motorist responses to congestion and pricing options were developed in Capacity project C04, which completed in June. Methods for evaluating capacity improvements achieved by specific management strategies were developed in Capacity project C05, which completes September 2010.

Resources for estimating the economic impact of projects to improve transportation capacity, including impacts on land use, land values, and the environment were developed in Capacity project C03, which completes in 2010.

Members of emergency medical services, fire, law enforcement, public safety communications, towing and recovery, and transportation communities are all responders at traffic incident scenes. SHRP 2 Reliability project L12 is developing and testing a proposed curriculum that establishes core competencies for each discipline and encourages cooperative training across the disciplines. Workshops to vet the approach have been held in Georgia and Indiana, others are planned.

Q: How can we reduce crashes?

> We know that nearly all collisions are caused by driver behavior. If we could really see what a driver is doing in the seconds before an accident or a near miss, it would open up an entirely new world of opportunities to help stop collisions before they happen.
>
> —Kenneth Campbell, Chief Program Officer, SHRP 2 Safety Research.

Changes in the traffic environment, such as increasing volume, high-speed congestion, and new vehicle technologies both complicate and heighten the need for fundamental research in traffic safety. SHRP 2 research asks if developing an understanding of how drivers interact with and adapt to the challenges of these dynamic conditions can significantly reduce roadway crashes. Progress in the Safety focus area this year finalized some of the complex foundational work that will support the naturalistic driving study and refined preparations for field data collection to begin at six sites later in 2010.

A: Study driver behavior

A field study of about 3000 drivers in 6 regions of the United States will yield the largest database of information on driver behavior ever collected. It will provide data critical to establishing objective estimates of crash risk, which can then be used to develop safety improvements. Preparing to accomplish these goals required a program of 14 research projects, of which 8 are now completed.

This year, the design of the field study of driving behavior was completed. That effort included devising a management plan, developing technical specifications for hardware and software, and creating both a data reduction manual and a data dictionary specific to the study. In addition, contractors were selected for the six data collection sites, which are being readied for operation. At the six sites, study participants will complete assessments of their visual perception, reaction time, driving knowledge, and other factors while their personal cars are being equipped with data acquisition systems. The systems, which were designed and manufactured this year, include video cameras, sensors of various types, radar, and a computer hard drive for encrypted data storage.

A plan for analyzing the data collected in the naturalistic driving study was completed as well; the plan integrates features of methods developed in four earlier projects.

Another aspect of the study requires knowledge of the characteristics of roadways that study participants will travel. Collection of data about factors such as edge-marking, rumble strips, lane width, shoulder type and width, curvature, grade, signing, and sight distance involves three projects. The first was completed this year; it assessed the state of practice for mobile roadway data collection and evaluated features of the technologies related to the safety analysis.

Work continues on a project to design a site-based study in which a system of overhead video cameras collects data on the trajectory and relative position of vehicles as they move through an intersection or a specified road segment. Automating the video processing to derive trajectory data is a particularly challenging aspect of the project.

SHRP 2 Naturalistic Driving Study Data Collection Sites

Tampa, Florida
Bloomington, Indiana
Erie County, New York
Raleigh-Durham, North Carolina
Central Pennsylvania
Seattle, Washington

PREPARING FOR IMPLEMENTATION

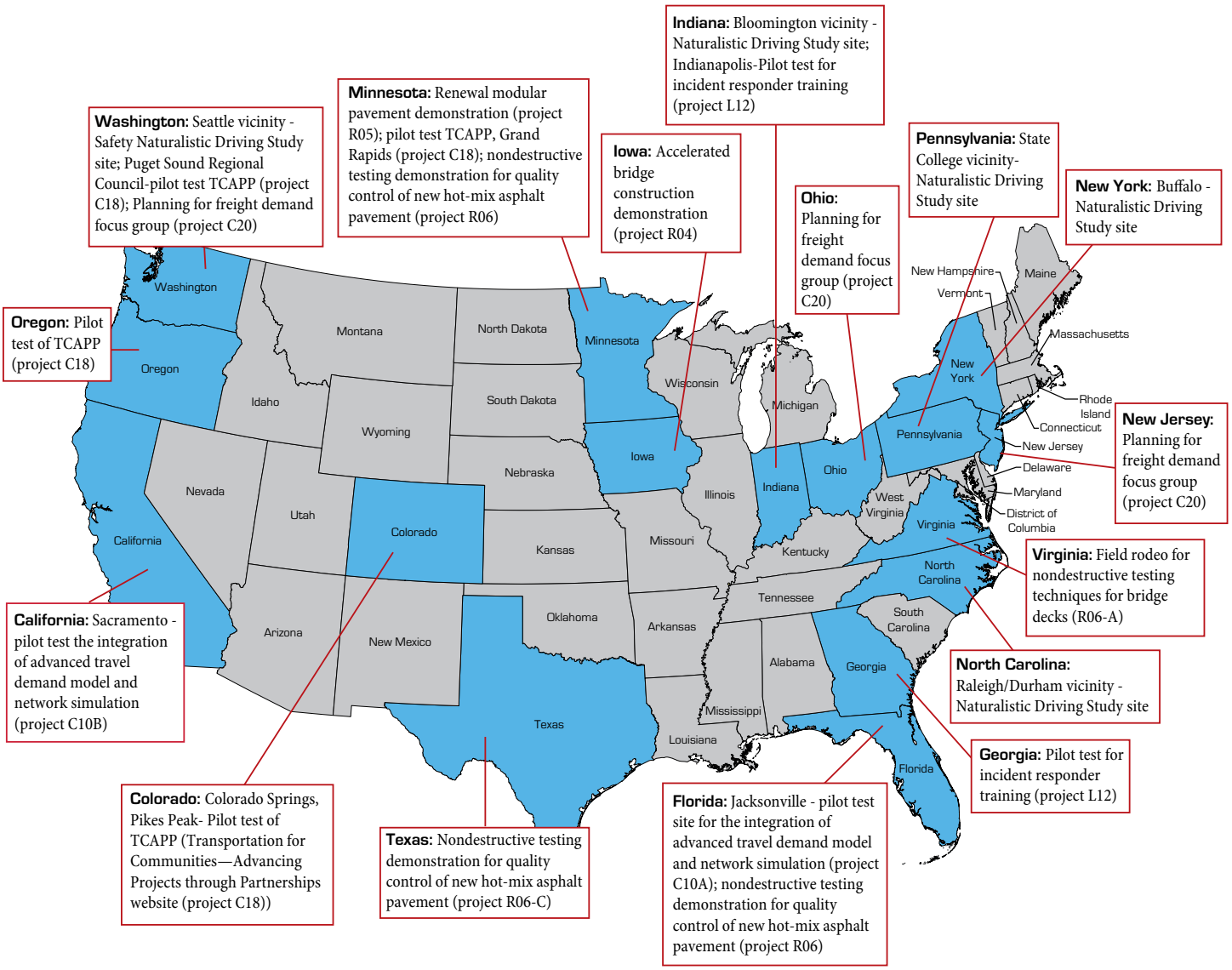
While SHRP 2's mission is to design and carry out a program of strategic research, this fourth year of program operation brought a considerable expansion of responsibilities. Continuing resolutions passed by the U.S. Congress in 2010 extended The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, which resulted in additional funds and a 2-year extension of SHRP 2. Although long-term responsibility for managing the implementation of SHRP 2 products will likely fall to others, including state and local transportation agencies, AASHTO, and the USDOT, the SHRP 2 Oversight Committee has decided to devote most of the additional time and money to early implementation-related activities. Until a long-term program is in place, the current SHRP 2 program will provide the focal point for implementation planning and for funding of pre-implementation activities.

At their meetings this year, the four Technical Coordinating Committees identified actions that would move the results of the most mature research projects to the next step of readiness for implementation. The Oversight Committee, at its June meeting, then selected and approved a slate of activities to refine and strengthen research results and move them toward practice. No new research was approved; rather, activities were selected to identify knowledge gaps and other barriers to implementation, conduct pilot tests, construct demonstration projects, and undertake similar efforts to advance research results along the developmental continuum to produce tools and products that are useful to transportation practitioners.

Some of these pre-implementation activities are under way in cooperation with state and local transportation agencies, metropolitan planning organizations, resource agencies, and other entities. The map indicates states where these activities are taking place.

16 States Participate in 22 SHRP 2 Activities

as of July 2010



SHARING THE NEWS

Webinars

Over the past year, SHRP 2 has hosted five Webinars in which researchers presented an overview of findings that are presented in detail in the final reports published for each project. This model has been effective for presenting technical information in a way that is timely, interactive, and independent of geography. The average Webinar attracts an audience of about 150, although some of the relatively less arcane topics have had nearly twice that number. Attendees receive the presentations in an email following the Webinar; others can view a summary of the presentations or purchase the recorded Webinar from TRB. SHRP 2 has also used this technology to present pre-bid information of interest to researchers who may be considering submitting a proposal to conduct research.

SHRP 2 in Motion

When SHRP 2 activities can be captured in a way that is visually interesting, video is posted on the website in a section named SHRP 2 in Motion. Interviews, presentations, and project demonstrations are posted there. The website is a reliable source for news and a host of resources related to the program.

Conferences, symposia, workshops and other meetings

SHRP 2 research contractors and staff made presentations at 67 meeting venues other than our own between July 2009 and June 2010. Presenters traveled to 27 states and 9 foreign countries to interact with various communities of interest, contributing what we've learned so far and benefitting from the synergy and knowledge of others working in these areas of practice and investigation.

Reports and other publications

Four research reports were published this year, along with 9 of an expected 23 case studies that document real-world best practices, pitfalls, and lessons learned about the use of collaboration in a wide range of activities in the transportation planning process.

FIRST FRUITS *Early outcomes of research*

First Fruits are products that emerge from the early stages of SHRP 2 research projects. They may include case studies, annotated bibliographies, survey results, compilations of practices and technologies, and other information developed in support of the larger research objectives. The first such document was published this year. It reports the findings of a survey of composite pavements throughout Europe that was conducted as an early phase of research to advance the design and construction of such pavements in the U.S.

Speakers Bureau

A Speakers Bureau is in development, expected to be active in late 2010. A section of the SHRP 2 website is being developed to support requests from committees, professional associations and other interested groups. Subject matter experts, many of whom have been active with SHRP 2 as research products developed, are being invited to speak on our behalf to inform their peers across the transportation community about the emerging products as plans for implementation evolve.

Subscriber News Alerts

Now it is easier to stay informed about upcoming events and the release of SHRP 2 products in your area of interest. Through our News subscription service, viewers can click a link on the SHRP 2 homepage to subscribe to news about any or all of the research focus areas. Subscribers receive occasional email announcements with links to detailed information targeted to their areas of interest. So far, nearly 1,200 people have subscribed.

RESEARCH PROJECT LIST

RENEWAL PROJECTS

(R01) Encouraging Innovation in Locating and Characterizing Underground Utilities

(R01-A) 3-D Utility Location Data: Technologies for Storage, Retrieval, and Utilization

(R01-B) Multi-Sensor Platforms for Locating Underground Utilities

(R01-C) Innovation in Location of Deep Utilities

(R02) Geotechnical Solutions for Soil Improvement, Rapid Embankment Construction, and Stabilization of the Pavement Working Platform

(R03) Identifying and Reducing Worker, Inspector, and Manager Fatigue in Rapid Renewal

(R04) Innovative Bridge Designs for Rapid Renewal

(R05) Modular Pavement Technology

(R06) A Plan for Developing High-Speed, Nondestructive Testing Procedures for both Design Evaluation and Construction Inspection

(R06-A) Nondestructive Testing to Identify Concrete Bridge Deck Deterioration

(R06-B) Evaluating Applications of Field Spectroscopy Devices to Fingerprint Commonly Used Construction Materials

(R06-C) Using Both Infrared and High-Speed Ground Penetrating Radar for Uniformity Measurements on New HMA Layers

(R06-D) Nondestructive Testing to Identify Delaminations between HMA Layers

(R06-E) Real-Time Smoothness Measurements on Portland Cement Concrete Pavements During Construction

(R06-F) Development of Continuous Deflection Device

(R06-G) NDT Techniques for Mapping Voids, Bonding, and Moisture Behind or Within Tunnel Linings

(R07) Performance Specifications for Rapid Highway Renewal

(R09) Risk Manual for Rapid Renewal Contracts

(R10) Innovative Project Management Strategies for Large, Complex Projects

(R11) Strategic Approaches at the Corridor and Network Level to Minimize Disruption from the Renewal Process

(R15) Strategies for Integrating Utility and Transportation Agency Priorities in Renewal Projects

(R15-B) Identification of Utility Conflicts and Solutions

(R16) Railroad-DOT Institutional Mitigation Strategies

(R19-A) Bridges for Service Life beyond 100 Years: Innovative Systems, Subsystems, and Components

(R19-B) Durable Bridges for Service Life beyond 100 Years: Service Limit State Design

(R21) Composite Pavement Systems

(R23) Using Existing Pavement in Place and Achieving Long Life

RELIABILITY PROJECTS

(L01) Integrating Business Processes to Improve Reliability

(L02) Establishing Monitoring Programs for Travel Time Reliability

(L03) Analytic Procedures for Determining the Impacts of Reliability Mitigation Strategies

(L04) Incorporating Reliability Performance Measures in Planning and Operations Modeling Tools

(L05) Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes

(L06) Institutional Architectures to Advance Operational Strategies

(L07) Evaluation of Costs and Effectiveness of Highway Design Features to Improve Travel Time Reliability

(L08) Incorporation of Nonrecurring Congestion Factors into the Highway Capacity Manual Methods

(L09) Incorporation of Nonrecurring Congestion Factors into the AASHTO Policy on Geometric Design

(L10) Feasibility of Using In-Vehicle Video Data to Explore How to Modify Driver Behavior that Causes Nonrecurring Congestion

(L10A,B,C) Feasibility of Using In-Vehicle Video Data to Explore How to Modify Driver Behavior that Causes Nonrecurring Congestion

(L11) Evaluating Alternative Operations Strategies to Improve Travel Time Reliability

(L12) Training and Certification of Traffic Incident Responders

(L13) Requirements and Feasibility of a System for Archiving and Disseminating Data from SHRP 2 Reliability and Related Studies

(L13A) Design and Implement a System for Archiving and Disseminating Data from SHRP 2 Reliability and Related Studies

(L14) Effectiveness of Different Approaches to Disseminating Traveler Information on Travel Time Reliability

(L15) Reliability Innovations Deserving Exploratory Analysis (IDEA)

(L16) Assistance to Contractors to Archive Their Data for Reliability

(L17) A Framework for Improving Travel Time Reliability

CAPACITY PROJECTS

(C01) A Framework for Collaborative Decision Making on Additions to Highway Capacity

(C02) System-Based Performance Measurement Framework for Highway Capacity Decision Making

(C03) Interactions between Transportation Capacity, Economic Systems, and Land Use Merged with Integrating Economic Considerations in Project Development

(C04) Improving Our Understanding of Highway Users and the Factors Affecting Travel Demand (emphasis on pricing and congestion)

(C05) Understanding the Contribution of Operations, Technology, and Design to Meet Highway Capacity Needs

(C06A) Integrating Conservation, Highway Planning, and Environmental Permitting Using an Outcome-Based Ecosystem Approach

(C06B) Development of an Ecological Assessment Process and Credits System for Enhancements to Highway Capacity

(C07) Integrating SHRP 2 products into the Collaborative Decision-Making Process. This project has been added to project C01.

(C08) Linking Community Visions and Highway Capacity Planning

(C09) Incorporating Greenhouse Gas Emissions into the Collaborative Decision-Making Process

(C10A–B multiple awards) Partnership to Develop an Integrated, Advanced Travel Demand Model and a Fine-Grained, Time-Sensitive Network

(C11) Development of Improved Economic Analysis Tools Based on Recommendations from project C03

(C12) The Effect of Public-Private Partnerships and Nontraditional Procurement Processes on Highway Planning, Environmental Review, and Collaborative Decision Making

(C15) Integrating Freight Considerations into Collaborative Decision Making for Additions to Highway Capacity

(C16) The Effect of Smart Growth Policies on Travel Demand

(C18) Pilot Test the Collaborative Decision-Making Framework with Three DOTS, Including a Self-Assessment Method

(C19) Add Expedited-Schedule Case Studies to Collaborative Decision-Making Framework Data Base

(C20) Freight Demand Modeling and Data Improvement Strategic Plan

(C21) Pilot Test the C06A and C06B Products: the Ecological Approach to Environmental Protection

(C22) Decision Maker's Guide to the Collaborative Decision-Making Framework

SAFETY PROJECTS

(S01A-E multiple awards) Development of Analysis Methods Using Existing Data

(S02) Integration of Analysis Methods and Development of Analysis Plan

(S03) Roadway Measurement System Evaluation

(S04A) Roadway Information Database Development and Technical Coordination and Quality Assurance of the Mobile Data Collection Project

(S04B) Mobile Data Collection

(S05) Design of the In-Vehicle Driving Behavior and Crash Risk Study

(S06) Technical Coordination and Independent Quality Assurance for Field Study

(S07A-F multiple awards) In-Vehicle Driving Behavior Field Study

(S08A-Xmultiple awards) Analysis of Driving Behavior Field Study Data and Countermeasure Implications

(S09) Site-Based Video System Design and Development

(S12) Data Acquisition System (DAS) Procurement

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