SHRP2 Solutions Fact Sheets:

Brief descriptions of the first tools from SHRP 2

SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

Strategic Highway Research Program

U.S. Department of Transportation | Federal Highway Administration
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About SHRP 2 Implementation

The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation's highway system.

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From the Reliability focus area:

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SHRP2 SOLUTIONS
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COLLABORATIVE DECISION-MAKING FRAMEWORK

A SYSTEM FOR DELIVERING PROJECTS PEOPLE WANT

Focus area: Capacity (C01)

PROBLEM: Elected officials and the public are demanding that highway projects be delivered both faster and in a more environmentally friendly manner. Transportation agencies are expected to do more than just mitigate environmental impacts; they are expected to be stewards of the environment and of the community, delivering transportation capacity in ways that support a community's vision. To meet these expectations, transportation professionals will need to change the way projects are planned and developed.

SOLUTIONS: To meet the public's demands for more efficient delivery of the right transportation solutions, transportation agencies need a systematic and enterprise-wide approach to collaboration that ensures that the right people are engaged at the right time with the right information. Based on research regarding projects that successfully addressed complex community and environmental issues, a Decision Guide was developed that provides a systematic approach that incorporates the keys to success learned from the research. It is delivered as a web-based resource that can be used as a trouble-shooting guide or a roadmap to changing a transportation agency's process for planning and developing highway projects.

The Guide is designed for practitioners and stakeholders. It identifies key decision points in four phases of transportation decision-making: long-range transportation planning, corridor planning, programming, and environmental review and permitting. An Executive Guide to Collaborative Decision Making will be a companion piece, indicating when and how senior transportation and environmental officials should be personally involved.

BENEFITS: The Decision Guide provides a structure for integrating the products and outcomes of other SHRP 2 research to strengthen the basis for decisions about when, where, and how much capacity is needed; what the economic impacts will be; and how to build capacity in ways that enhance communities and the environment. These research outcomes collectively map a route to decisions that deliver highway capacity.

STATUS AND CONTACTS: This research for project C01 is complete and the product, *Transportation for Communities—Advancing Projects through Partnerships (TCAPP)*, is available as the beta website www.transportationforcommunities.com. For additional information, contact Spencer Stevens, Spencer.Stevens@dot.gov; Matt Hardy, mhardy@aashto.org; or Stephen Andrle, sandrle@nas.edu. TCAPP is scheduled for implementation in 2013.

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PERFORMANCE MEASURES FOR HIGHWAY CAPACITY DECISION MAKING

Focus area: Capacity (C02)

TOOLS TO CONSISTENTLY EVALUATE ALL THE SYSTEMS AFFECTED BY EXPANSION PROJECTS

PROBLEM: Public concerns about the impacts of adding highway capacity and how alternatives are evaluated add urgency to the need for measures of highway system impact and performance. To reach decisions with broad support, transportation agencies now need a better understanding of system-level performance in terms of economic, mobility, accessibility, safety, environmental, community, and social considerations. The data collection and analysis techniques for addressing some of these topics are not well developed. Better approaches are needed for quantifying transportation system performance in non-traditional areas.

SOLUTIONS: An online resource has been developed for selecting among performance measures that help evaluate major transportation projects within a system context. Organized around five broad topics and 20 performance factors (shown below), this framework helps identify the types of project impacts that are important to making informed decisions and the level of detail required at each stage of the planning process. The framework explains how the performance measures can be used in long-range planning, programming, environmental review, and permitting.

TRANSPORTATION	ENVIRONMENT	ECONOMIC	COMMUNITY	COST
Mobility	Ecosystems, Habitat, Biodiversity	Economic impact	Land use	Cost
Reliability	Water quality	Economic development	Archeological and cultural resources	Cost effectiveness
Accessibility	Wetlands		Social	
Safety	Air quality Climate change Environmental health		Environmental justice	

BENEFITS: Performance measures have communication value as well as analytical value because they support better collective understanding of the transportation problem being addressed. Each constituency can see a measure that relates to its own concerns, and can better understand the concerns of others. Performance measures that speak to stakeholders' concerns establish a foundation for making the best transportation decisions, reducing delays, and speeding project delivery.

STATUS AND CONTACTS: Project C02 is complete and the final report, *Performance Measurement Framework for Highway Capacity Decision Making,* is available online. The performance measurement framework is available in TCAPP at www.transportationforcommunities.com. TCAPP is scheduled for implementation in 2013.

For more information, contact Harlan Miller, Harlan.Miller@dot.gov; Matt Hardy, mhardy@aashto.org; or Steve Andrle, sandrle@nas.org.

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T-PICS: A tool to estimate the economic impact of transportation projects

ACHIEVING MORE REALISTIC IMPACT ESTIMATES

Focus area: Capacity (C03)

PROBLEM: Strengthening the economic vitality of a region (jobs and income) is one of the primary reasons for investing in highway capacity. Better access to markets and labor force, reduced cost of delay, reduced congestion, improved safety, reduced pollution, and a better quality of life are all elements of improving economic vitality. However, the ways in which new and improved highway capacity influences economic vitality are complex and often indirect, which complicates decisions about transportation projects.

SOLUTION: Transportation Project Impact Case Studies (T-PICS) is a web tool that planners can use to quickly see the range of economic development impacts that occur as a result of different types of projects in different settings. T-PICS includes 100 case studies of already-built highway capacity projects and their economic development impacts. Each case study includes pre- and post-project economic and land development data and local interviews that together portray the actual, observed economic development impacts of those projects, as measured at least five years after project completion.

Estimates for traffic and project costs and complementary regional economic development factors can be adjusted to account for local conditions. In turn, these adjustments will drive changes in the T-PICS output. Case study projects can be viewed through Google Earth. T-PICS is available at http://transportationforcommunities.com/t-pics.

BENEFITS: T-PICS results can help refine public debate about highway projects by establishing boundaries of the likely positive and negative impacts that typically occur from such projects. Economic development impacts include changes in employment, income, business output and associated changes in land values and land development and short-term construction spending and dislocation effects. Understanding what changes in productivity result from improvements in market accessibility, intermodal connectivity, scheduling, logistics and international competitiveness helps communities and transportation agencies identify transportation options to meet their goals.

SCHEDULE AND CONTACT: Research reports will be online in the fall of 2012 at www.TRB.org/SHRP2 under Publications. Pilot tests to validate results and refine usability to be completed late 2013. For more information, contact Stefan Natzke, Stefan.Natzke@dot.gov; Matt Hardy, mhardy@aashto.org; or David Plazak, dplazak@nas.edu. The products are scheduled for implementation in 2014.

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INTEGRATING CONSERVATION AND HIGHWAY PLANNING

A PRACTICAL GUIDE TO MEETING ECOLOGICAL PRIORITIES

Focus area: Capacity (C06)

PROBLEM: Transportation agencies recognize the ecological and economic benefits of integrating landscape-scale environmental considerations into highway planning, but the barriers to achieving the goal are high. Ecosystem-based approaches need to be easier, more practical, and a management priority if they are going to be widely implemented.

SOLUTION: The Integrated Ecological Framework (IEF) is a nine-step, science-based process that helps practitioners identify ecological priorities within a region and make timely decisions about transportation capacity enhancements, thus enabling win-win solutions for both transportation and the environment. The IEF provides clear and feasible steps that advance integration and it links to a business model that helps support the ecological approach to environmental stewardship.

The IEF includes tools to overcome important obstacles to integrating highway planning and ecological considerations, such as the need to analyze alternatives and cumulative effects, and to develop regulatory assurances and ecosystem crediting strategies.

BENEFITS: The long-term benefits of applying the IEF process are better environmental outcomes and lowered costs associated with planning and regulatory decision making. In the short term, the IEF provides practical guidance on the most appropriate and effective data, methods, tools, and processes to achieve an integrated, landscape-scale approach to transportation decision making.

SCHEDULE AND CONTACTS: The research in Capacity projects C06-A and C06-B is complete. The research reports will be available online in mid-2012. The IEF and related tools are being integrated into the web-based resource www.TransportationforCommunities.com. These tools are scheduled for implementation in 2012. For more information, contact Shari Schaftlein, Shari.Schaftlein@dot.gov; Shannon Eggleston, seggleston@aashto.org; or Stephen Andrle, sandrle@nas.edu.

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IMPROVED ECONOMIC ANALYSIS TOOLS

MORE COMPLETE ECONOMIC ANALYSIS WITH EASIER-TO-USE TOOLS

Focus area: Capacity (C11)

PROBLEM: Governments and taxpayers need to know whether a region will be better off economically as a result of proposed transportation investment. Current tools for estimating economic impacts of highway capacity enhancement projects are often complex and their outcomes can be difficult to explain to decision-makers and the public. Planners need forecasting models that are more transparent and that provide decision makers with more complete understanding of the economic impacts of highway projects.

SOLUTION: SHRP 2 is developing a suite of new analysis tools and statistical models that will provide the range of reasonable economic impact expectations for a proposed highway project. The new tools also enable a wider economic analysis by integrating four components: reliability of travel time, connectivity to intermodal facilities for freight and passengers, access to labor and product markets, and an accounting tool that integrates the other three components and creates benchmarks to the local area. The outcome of this process describes the project's ultimate economic impact in terms of direct effect, total local effect, and total national effect.

BENEFITS: A convincing economic analysis should include both gains and losses. Planners need to consider the net impact of both primary and secondary project effects. These vary by region of the country, whether the region is urban or rural, political attitudes, land use and development policies, major economic drivers, economic growth forces, the nature of capacity problems, and the solutions proposed. Secondary effects, such as environmental justice factors and the value of environmental resources lost or degraded due to a project are also important to achieving a balanced impact estimate. By considering net effects, the SHRP 2 tools provide decision makers with better information for answering the question of whether a region will be economically better off because of a transportation investment, and if so, by how much.

SCHEDULE AND CONTACT: The analysis tools from project C11 are in development and will be downloadable from the T-PICs web site in 2013. The tools are scheduled for implementation in 2014. For more information, contact Stefan Natzke, Stefan.natzke@dot.gov; Matt Hardy, mhardy@aashto.org; or David Plazak, dplazak@nas.edu.

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CONSIDERING FREIGHT IN TRANSPORTATION PLANNING

PLANNING FOR HIGHWAY CAPACITY THAT SERVES GOODS MOVEMENT

Focus area: Capacity (C15)

PROBLEM: Freight transport will continue to use an increasing portion of highway capacity. Often when transportation agencies act to improve capacity, the economics of freight supply chains and how the movement of freight is likely to react to capacity improvements are not part of planning and engineering decision making. Freight shippers, receivers, and carriers are highway stakeholder groups whose needs and motivations are not always well understood by the public sector. This gap leaves great potential for unintended consequences, including negative impacts on economic competitiveness, activity, development, and growth.

SOLUTIONS: A transportation practitioner's guide is being developed regarding how to conduct market-driven freight planning. The transportation-related cost factors in supply chains include travel time, speed limits, truck size and weight, fuel cost, toll cost, and cost of delay. How changes in these elements affect decisions on freight transportation depends on the overall impact on supply chain costs and the method of payment. The practitioner's guide provides a blueprint for appropriate consideration of freight transportation, from international to local, in the highway capacity planning and project development processes, including the key decision points at which freight stakeholder participation is critical for reaching good decisions.

BENEFITS: Growing freight demand is a key driving factor in the need for new highway capacity. While there are many proposals for addressing this need, the planning and engineering communities need a better understanding of freight economics so they can make capacity enhancement decisions that are beneficial to goods movement and the resulting economic efficiencies. Planning for and providing highway capacity that serves economic development helps deliver highway projects with local and national benefits.

RESEARCH OBJECTIVES: The research is meant to provide guidance to state DOTs, MPOs, decision makers, and stakeholders on appropriate consideration of freight in planning for and providing highway capacity that serves economic development. The guidance is to include case studies and examples of successful practice and will be integrated into www.transportationforcommunities.com, the online decision guide for highway planning.

SCHEDULE AND CONTACT: The research for project C15 is complete and the contract is being extended to conduct pilot tests and introduce the guide to user communities. Final products are expected in the spring of 2013. For more information, contact Ed Strocko, Ed.Strocko@dot.gov; Leo Penne, lpenne@aashto.org; or David Plazak, dplazak@nas.edu. Implementation is scheduled for 2014.

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EXPEDITED PROJECT DELIVERY

STRATEGIES TO AVOID COMMON EARLY CAUSES OF PROJECT DELAYS

Focus area: Capacity (C19)

PROBLEM: Delay in delivering new transportation projects can increase costs, prolong congestion, and deny the nation the economic and mobility benefits of added transportation capacity. As there is potential for delay in every phase of project delivery, a range of strategies is needed to address common problems and constraints and to provide ways to expedite delivery from the earliest project phases.

SOLUTIONS: Twenty-four strategies for addressing or avoiding 16 common problems or constraints on project delivery were developed and grouped into six expediting themes: improve public involvement and support; improve resource agency involvement and collaboration; demonstrate real commitment to the project; improve internal communication and coordination; streamline decision making; and integrate across all phases of project delivery. The constraints, their potential severity, and the effect they can have on project delivery are cataloged. Since it is not always clear to practitioners that they are facing a constraint, leading and lagging indicators are provided. The likely effects of not addressing a constraint are categorized as low, medium, or high; multiple strategies are suggested for each severity category. A worksheet was developed for each mitigation strategy that includes background and case examples of how the strategy was used and to what effect.

BENEFITS: Reducing project delays saves more than time. Project costs and road user costs can escalate while public perception of agency performance deteriorates as transportation enhancements fail to materialize. The ability to anticipate where delays are likely to occur and to select from tested strategies known to avoid or minimize delay confers benefits to transportation agencies and stakeholders in all phases of project delivery.

SCHEDULE AND CONTACT: The research for project C19 is complete and a final report, *Expedited Planning and Environmental Review of Highway Projects*, is available online and from the TRB Bookstore. The strategies and tools developed in this project and provided in the final report are the basis for Expediting Project Delivery Assessment Tool that is available in TCAPP, the website that houses most SHRP 2 Capacity products: http://transportation for communities.com. For more information, contact Anwar Ahmad, anwar.ahmad@dot.gov; Kelley Rehm, krehm@aashto.org; or Stephen Andrle, sandrle@nas.edu. Implementation is scheduled for 2013.

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Organizing to Improve Travel-Time Reliability

Road users see the benefits of managing highway operations

Given that traffic congestion caused by weather, crashes, and other events creates more than 50 percent all motorist delay, processes to better manage traffic operations and leverage existing capacity will make the highway system more reliable and reduce the cost of congestion for drivers, freight operators and other users.

Several new tools to help agencies advance their business practices as well as their organizational structures are now available from the second Strategic Highway Research Program. Taken together, they provide a structure to modernize current practices and, ultimately, improve the overall transportation network.

Integrating Business Processes to Improve Reliability

The Solution

A new suite of guides and web tools will assist transportation agencies in integrating travel-time reliability into planning, programming, and project delivery processes while overcoming inter-departmental and inter-agency barriers to improving highway operations. Because reliability is an emerging business activity, materials are also being developed to help agency leaders recognize the value of reengineering day-to-day business practices to optimize the benefits of operations management.

The first product (L01) focuses on integrating business processes to improve reliability, which will effectively reduce congestion by providing methods to mitigate the effects of incidents, weather, work zones, special events, traffic control, devices, fluctuations in demand, and bottlenecks.

The second product (L06), which includes a web-based self-evaluation guide, provides a comprehensive and systematic examination of ways agencies can be more effectively organized to successfully execute operations programs that improve travel-time reliability.

Together they offer:

- A detailed introduction to applying a highly successful business-process mapping tool to improve highway systems operation.
- Case studies that show how business processes were successfully re-engineered in traffic incident management, work zone management, and other areas related to travel time reliability.
- A system and templates for advancing an agency's ability to improve systems operations and management.

Fostering Faster Travel-Time Reliability through Smarter Operations

FOCUS AREA: Reliability (L01/L06)

Comprehensive guides and web-based tools to advance business practices and identify practical measures that ease congestion and keep cars and trucks moving.

Save Lives

- Faster incident clearance reduces secondary crashes.
- Standard procedures protect responders.
- Improves work zone management and operations, resulting in safer, more efficient, and less congested work zones.

Save Money

- Streamlined operations lead to cost savings.
- Abbreviated closures and earlier identification of problems reduce costs of congestion for travelers and freight industry.

Save Time

- Tools lead to reduced traffic congestion and traveler delay.
- Preventive measures mitigate problems before serious delays and bottlenecks occur.

Who Does It Benefit?

- State and local highway agencies
- Incident responders
- Contractors
- Drivers
- Designers
- Taxpayers

The Benefits

Improving travel-time reliability by improving operations management is like discovering new highway capacity. Road users can see the benefits of techniques such as quick clearance, roadside assistance, alternative route information and other strategies. Organizing agencies to integrate systems operations and management strategies offers the additional benefits of improved coordination and collaboration in other business areas and helps to build opportunities and the impetus to continually improve processes.

How can you learn more?

To have a SHRP2 representative contact you about technical assistance or other information, contact Robert.Arnold@dot.gov; Wayne.Bergman@dot.gov; Stephen.Clinger@dot.gov; Gummada Murthy at gmurthy@aashto.org; David Plazak at dplazak@nas.edu; or Bill Hyman at whyman@nas.edu. A web-based tool, *Systems Operations Management Guidance*, is available on the AASHTO website at **aashtosomguidance.org**. The following resources are available online and from the TRB Bookstore:

- *Integrating Business Processes to Improve Travel Time Reliability*: *http://www.trb.org/Publications/Blurbs/165283.aspx*
- *Guide to Integrating Business Processes to Improve Travel Time Reliability*: http://www.trb.org/Publications/Blurbs/165284.aspx
- *Institutional Architectures to Improve Systems Operations and Management*: *http://www.trb.org/Publications/Blurbs/165285.aspx*
- *Guide to Improving Capability for Systems Operations and Management*: *http://www.trb.org/Publications/Blurbs/165286.aspx*

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Predicting the Unpredictable:
Better Travel-Time Reliability for Busy Roads

New tools help identify the best ways to improve travel-time reliability by addressing the causes of delay.

Unexpected traffic delays caused by crashes, work zones, special events or other factors can cause frustration and increased hazards for those who depend on a reliable and safe trip on a predictable basis. More effective planning tools that help reduce congestion can also reap great improvements in safety, in addition to cost and time savings.

A suite of new products developed in the second Strategic Highway Research Program provides transportation agencies with predictive tools to plan for and respond to non-recurrent congestion and its cascading effects. The products will aid in:

- Establishing monitoring programs for mobility and travel-time reliability;
- Incorporating reliability performance measures into transportation planning and programming processes; and
- Incorporating travel-time reliability into the *Highway Capacity Manual*

Reliability Analysis Tools

The Solution

Establishing Monitoring Programs for Mobility and Travel-Time Reliability (L02)**:** This tool provides a blueprint for designing programs to monitor travel-time reliability and a guidebook for designing, building, operating and maintaining those systems. The guidebook addresses freeways, toll roads and urban arterials, and provides direction on technical, analytical, economic and institutional implementation issues.

Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes (L05): This "how-to" handbook provides the means—including technical procedures—for state DOTs and MPOs to fully integrate mobility and reliability performance measures and strategies into transportation planning and programming processes. It provides guidance on how to maintain or improve traffic throughput on existing systems before capacity enhancement projects are undertaken or where capacity improvements cannot practically be undertaken. This product will be integrated into the Collaborative Decision Making-Framework web-based tool being developed as a part of the SHRP2 Solutions Capacity Project known as TCAPP.

Accurately forecasting travel times on heavily traveled roads

Focus Area: Reliability (L02/L05/L08)

Tools to help transportation planners better predict and plan for unexpected travel delays.

Save Lives

- Reducing reliability-related delays will result in fewer incident-related crashes.

Save Money

- Investments in reliability improvements have benefit-cost ratios ranging from 5:1 to 30:1 due to reduced traffic delays and improved safety.
- Less variability in travel time means less time has to be planned for trips. Improved reliability supports efficient freight movement, with national economic benefits.

Save Time

- More reliable travel-time information enables better trip planning and less time traveling.
- Reduced delay and lost productivity.

*Incorporating Travel-Time Reliability into the Highway Capacity Manual (*L08): New analytical procedures developed as part of this effort incorporate travel-time reliability into the *Highway Capacity Manual*, which will enable planners and engineers to apply travel-time reliability performance measures to major freeways and urban streets in a corridor context.

The Benefits

This suite of tools will help DOTs better analyze strategies for addressing causes of non-recurrent congestion and improve travel-time reliability. Once these strategies are in place, variability will be reduced, offering more reliable travel times for commuters and other travelers as well as the freight industry. Additional benefits are potential savings in fuel and emissions, a better functioning freight system, and fewer crashes.

Breakthroughs in reliability planning also pave the way for all types of operational improvements to be considered at the same time as more traditional project investments. The result will be more prudent investment of limited dollars and optimal value from existing investments in capacity.

Who will benefit from the use of these tools?

- State and local transportation agencies
- Shippers and Receivers
- Business owners
- Commuters

How can you learn more?

To have a SHRP2 representative contact you about technical assistance or other opportunities to use these reliability tools, contact Robert Rupert at Robert.Rupert@dot.gov; Douglas Laird at Douglas.Laird@dot.gov; Jim Hunt at Jim.Hunt@dot.gov; Gummada Murthy at gmurthy@aashto.org; or William Hyman at whyman@nas.edu.

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National Traffic Incident Management Training

Faster, safer incident recovery *depends on an integrated, well-trained responder corps.*

First responders study traffic incident scenarios as part of a training pilot held in Georgia.

The impact of traffic incidents on highway operations, reliability, and safety is well known and alarming. About 25 percent of all delays are caused by traffic incidents. Congestion costs are counted in hundreds of billions of dollars and wasted fuel is measured in billions of gallons. More importantly, traffic incidents pose a significant safety risk to both responders and travelers. The likelihood of a secondary crash increases with each minute that an incident remains unresolved.

Clearing incident scenes quickly with a well-coordinated, multidisciplinary team of first responders and transportation personnel is an important means of reducing the risk of secondary crashes and congestion delays. The second Strategic Highway Research Program (SHRP2) now offers multidisciplinary training for both responders and trainers to meet this need.

The benefits of SHRP2's National Traffic Incident Management Training include:

- A unified, multidisciplinary approach that promotes a more effective incident response.
- Lessons in new multi-agency standards and best practices.
- Curricula based on 100 core competencies from 9 disciplines shown to improve on-scene responder and driver safety.
- A train-the-trainer curriculum that provides cost-effective alternatives for qualified trainers across the country.

Save Lives

Better training leads to faster incident response and clearance. This means fewer secondary crashes result from the original incident, and less exposure to moving traffic while the incident is resolved.

Save Money

Efficient response also saves money. In Atlanta, improved incident clearance practices reduced secondary crashes by 69 percent in 12 months, saving lives and more than $1 million.

Save Time

Well-trained responders can cut clearance time in half, decreasing delays caused by incident-related congestion. Train-the-trainer courses help responders learn more quickly.

Photo credits: (top/center) iStockphoto.com; (lower right) SAIC.

To learn more about Traffic Incident Management Training, email: **Paul Jodoin** at **paul.jodoin@dot.gov** or **Tim Lane** at **thomas.lane@dot.gov**
For more information about other SHRP2 Solutions, visit: **www.TRB.org/SHRP2**.

A Stronger Responder Corps

Traffic Incident Management Training helps improve traffic incident response. Better incident response improves the safety of responders and drivers, reduces crashes that occur because of incident-related congestion, decreases traffic delays caused by incidents, and can cut incident response time in half.

Delivered in an intensive, two-day course or single-lesson modules, SHRP2's Traffic Incident Management Training includes:

- Interactive seminars
- Case study analysis
- Tabletop role-play and scenarios
- Field practicum that focus on the safety of responders and drivers, quick clearance, and effective communications at traffic incident scenes

Photo credit: SAIC

First responders participate in a training pilot held in Georgia.

Who Benefits?

- Law enforcement
- Fire and rescue
- Emergency medical services
- Transportation agencies
- Training and recovery professionals
- Notification and dispatch personnel
- Hazardous materials management responders
- Coroners and medical examiners
- Public works professionals
- The public

To learn more about the Federal Highway Administration's Traffic Incident & Events Management program, including National Traffic Incident Management Training, visit: **www.ops.fhwa.dot.gov/eto_tim_pse**.

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STRATEGIC HIGHWAY RESEARCH PROGRAM

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SP-12-002-03

KNOWLEDGE TRANSFER SYSTEM FOR SYSTEMS OPERATIONS & MANAGEMENT

Focus area: Reliability (L17)

Easy Access to Essential Information

PROBLEM: As an emerging approach to reducing nonrecurring congestion and improving mobility, the area of travel time reliability has yet to develop the basic elements on which an area of practice can be built. These include a common language that overcomes the technical jargon of various disciplines, the basic analytical tools and guidance that support acceptance and use of new strategies and techniques, and a widely acknowledged source of reliable information.

SOLUTION: An online resource known as a Knowledge Transfer System for the field of systems operations and management (SO&M) is being developed. It will provide a first point of access to key materials, including syntheses of all SHRP 2 Reliability research, new information that fills gaps in current knowledge, a glossary of common terms, and business case resources. It will also function as a portal to the complete range of information on SO&M. Community-building functions such as peer dialog and news and events will also be features of the Knowledge Transfer System. Content is of use to policy-makers, practitioners, and researchers.

BENEFITS: The Knowledge Transfer System establishes a home base for this emerging area of practice. By collecting, developing, and supporting the exchange of knowledge across the topic, it raises the visibility of systems operations and management as an efficient approach to meeting travel demand. It will serve as the "go to" resource for those who are involved in managing and improving traffic operations and travel time reliability.

SCHEDULE AND CONTACTS: A working version will begin a beta testing phase in the fall of 2012. For information, contact Gummada Murthy, gmurthy@aashto.org, or David Plazak, dplazak@nas.edu.

About SHRP 2 Implementation

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REGIONAL OPERATIONS FORUM

GAINING GROUND IN THE FACE OF GROWING DEMAND

FOCUS AREA: RELIABILITY (L36)

PROBLEM: Many new strategies, technologies, and practices are emerging to help transportation agencies realize the benefits of operating highway systems to improve travel time reliability and safety, but they have not yet been routinely incorporated into business processes and decision making. Many transportation agency leaders do not have a background in transportation operations, and as a result lack an understanding of how to move their agencies toward an operations orientation. A total-immersion forum is needed for transportation agency leaders to learn about leadership and management issues related to operations and reliability if they are to take advantage of the many advances being made in operations.

SOLUTION: This project will develop a curriculum and model for establishing regional forums at which senior managers and program leaders can build expertise in the emerging strategies for improving travel time reliability. The curriculum includes topics such as the principles of building capability within organizations, performance measurement, goods movement, workforce development, and building a business case for systems operations and management. Participants will also learn how to create individual implementation plans.

BENEFITS: By understanding the inherent value of advanced operations strategies and how to implement them, transportation leaders can increase their agency's ability to operate highway systems to gain the economic, environmental, and safety benefits of reliable travel times.

SCHEDULE AND CONTACTS: Project L36 is just getting under way. The forum will be piloted in 2013, with full implementation of the forums occurring in 2014. For more information, contact Steve Clinger, Stephen.Clinger@dot.gov, Gummada Murthy, gmurthy@aashto.org; or Neil Pedersen at npedersen@nas.edu.

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BRIDGE DESIGNS FOR RAPID RENEWAL

WITH STANDARD PLANS, LOCAL BUILDERS CAN REPLACE WORKHORSE BRIDGES FAST

Focus area: Renewal (R04)

PROBLEM: Across the nation, many thousands of typical bridges need to be replaced. With today's understanding of construction's impact on congestion, worker and traveler safety, the environment and quality of life, it is appropriate that traditional sequential approaches to design and construction be reassessed. The industry must find smarter and faster ways of rebuilding the nation's transportation system using standardized approaches that allow rapid renewal, economies of scale in manufacturing and construction, reduced traffic disruption, and increased safety.

SOLUTION: A design tool kit was developed for rapid renewal bridge projects. It includes standard plans and details for foundation systems, substructure and superstructure systems, subsystems, and components. The tool kit also advances jointless technology to a new level that results in a bridge that is essentially jointless, providing good strength and seismic performance, redundancy, and long-term durability. Video of construction using these techniques is online at http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/ABC_for_Everyday_Bridges_618.aspx.

BENEFITS: These standardized plans transform sequential processes into complete bridge systems that come ready for immediate installation at the site, bridges that can be replaced in totality or incrementally with little or no impact to rush-hour traffic, and bridges that can be readily moved to new locations for reuse to address traffic pattern changes and emergency replacements. Construction can be mastered by local contractors and prefabricated elements can be lifted with conventional equipment.

SCHEDULE AND CONTACT: Research is complete on project R04, although the tool kit will be updated to reflect what is learned in pilot projects, which are being constructed in New York and Vermont, with completion expected in late 2012. These follow a successful two-week installation over the Keg Creek, near Council Bluffs, Iowa, in 2011. The project final report will be available on the web at www.TRB.org/SHRP2/publications and the tool kit will be available online in the fall of 2012. For more information, contact Shay Burrows, Shay.Burrows@dot.gov; Kelley Rehm, krehm@aashto.org; or Monica Starnes, mstarnes@nas.edu.

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Precast Concrete Pavement (PCP)

An efficient and lasting solution *for rapidly building and repairing highways that offers faster project schedules, reduced congestion, and improved safety.*

Left: Prestressed PCP, Virginia DOT;
Right: Jointed PCP, Minnesota DOT.

It's time you took another look at precast concrete pavement (PCP) solutions. PCP has come a long way in the past 10 years; precast panel prices have dropped more than 50 percent, and pre-stressed and jointed systems are now being effectively used in more than half a dozen states. Today, PCP is a versatile approach that can be used in the rehabilitation of roadways, toll plazas, intersections, freeway ramps, bridge approach slabs, and tunnels in addition to new roadway construction projects. PCP also offers quality and durability similar to or better than traditional cast-in-place (CIP) concrete pavement construction and rehabilitation.

The benefits of PCP are clear: faster construction using high-quality, prefabricated concrete panels will result in long-lasting infrastructure, less congestion, lower maintenance costs, and most importantly, safer roads. PCP offers the following benefits:

- Rapid installation for reduced congestion and traffic maintenance costs
- Safer work zones through reduced exposure of workers and drivers
- Traffic-ready upon installation, no curing time
- Slabs are cast in plants under ideal conditions for optimum quality
- Can be installed at night or under adverse weather conditions, extending the construction season
- Can extend the life of deteriorating assets
- Durability similar to or better than traditional CIP solutions

Save Lives

Shorter work windows lead to less exposure of construction workers and drivers.

Save Money

Installation costs for PCP are slightly higher than alternative CIP solutions. However, the significantly reduced installation time and traffic maintenance costs lead to long-term savings. Further, the longer-lasting panels result in significantly reduced repair costs.

Save Time

PCP enables rapid installation, and most roadways can remain partially open during the installation process for reduced congestion and minimal impact to users.

Photo credits: Minnesota DOT

For more information about precast concrete pavement, visit **www.precastconcretepavement.com**, or contact Sam Tyson at FHWA: sam.tyson@fhwa.dot.gov | (202) 366-1326

Guidelines for Faster Construction and Longer-Lasting Results

The second Strategic Highway Research Program (SHRP2), a collaborative effort of the Federal Highway Administration, American Association of State Highway and Transportation Officials, and the Transportation Research Board, now offers a series of guidelines to help you effectively select, design, fabricate, and install PCP systems. The guidelines and documentation (listed below and available at **www.precastconcretepavement.com**) were developed based on field tests at 15 locations, participation in construction planning meetings, and visits to construction projects and precast concrete fabrication plants, all occurring since 2003.

- Overall findings related to viability of PCP
- Findings based on SHRP2 field testing
- Guidelines for PCP project selection
- Guidelines for PCP system acceptance
- Guidelines for design of PCP systems
- Guidelines for PCP fabrication
- Guidelines for PCP installation
- Model specifications

Who is using precast concrete pavement?*

Agency	System	Projects
Caltrans	Precast, prestressed, and jointed PCP Caltrans designed	I-680 (prestressed system) I-15 (jointed system) and other locations
Illinois Tollway	Jointed PCP for repairs Tollway designed and Fort Miller Co. systems	Several projects in the Chicago area
Iowa DOT	Precast, prestressed, and jointed PCP for approach slabs	Highway 60 near Sheldon, IA Iowa 43 near Denver, IA
New Jersey DOT	Jointed PCP for repairs Fort Miller Co. system	Several projects along I-95 and other primary roadways
New York State DOT	Jointed PCP for repairs The Roman Stone Co. system	Route 27, Long Island, NY
New York State Thruway Authority	Jointed PCP for toll plaza areas and for repairs Fort Miller Co. system	Tappan Zee toll plaza and other locations
Utah DOT	Utah DOT-designed and Fort Miller Co. systems	I-15 and other locations
Virginia DOT	Precast, prestressed (Virginia DOT designed) Jointed (Fort Miller Co.)	Fairfax County, VA I-66 mainline (prestressed system) I-66 ramp (jointed system)

*Does not represent all PCP installations.

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SP-12-003-02

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Nondestructive Testing Procedures

Using high-speed nondestructive testing procedures for both design evaluation and construction inspection

The competing demands that highway agencies face as they design, construct, and inspect roads and bridges create pressures to build solid, durable infrastructure that requires minimal traffic disruption. In an era of constrained budgets and high public expectations, state and local transportation agencies need to know that their testing procedures are thorough, reliable, and fast.

Nondestructive testing techniques developed through the second Strategic Highway Research Program allow for the rapid inspection of existing as well as newly constructed roadways, bridge decks, and tunnels, resulting in quicker reopening times. The techniques have already shown significant benefits in field testing, including shorter inspection times, cost savings, earlier identification of deterioration and wear on bridge decks and pavements, and more efficient tunnel inspections.

Nondestructive Testing Procedures for Design Evaluation and Construction Inspection

The Solution

Nondestructive testing techniques for use on high-speed roadways (R06) provide decision makers with the tools to ensure thorough, reliable, and safe processes to achieve long-term performance and maximum service life of publicly-funded infrastructure.

Notable features of NDT include:

- A tested, high-quality method of ensuring the quality of new construction.
- Early identification of the extent and cause of bridge deck deterioration.
- Opportunities to measure changes in tunnel linings over time.
- Improved options for measuring the condition and quality of new and existing pavements

The Benefits

The use of nondestructive techniques contributes to a faster, more efficient process for the state or local transportation agency and its employees. Faster re-opening of new facilities saves closure

Reliable Testing Procedures Benefit DOTs and Drivers

Focus Area: Renewal (R06)

Nondestructive methods get work done quickly and identify wear and tear on highways, bridges, and tunnels earlier.

Save Lives

- Shorter duration of work zone set-ups leads to safer traffic conditions.
- Preventative maintenance reduces accidents due to road conditions.

Save Money

- Cost savings are achieved from abbreviated closures and earlier identification of problems before they require more extensive repairs.

Save Time

- Faster inspections lead to reduced traffic congestion and traveler delay.
- New facilities can be opened and in use more quickly.
- More efficient use of staff saves time and money.

costs and produces safer traffic conditions with a shorter duration of work zone traffic set-ups, while the preventative maintenance approach allows problems to be identified before they require extensive repairs. This, in turn, reduces traffic congestion and traveler delay. By using nondestructive techniques, repairs are completed faster, more safely, and with minimal impact on commuters.

Who benefits from these tools?

- State departments of transportation
- Local highway agencies
- Contractors
- Drivers
- Highway, tunnel, and bridge designers
- Taxpayers

Strategic Objective

The strategic objective of highway renewal research in SHRP 2 is to develop the necessary tools to "get in, get out, and stay out" when renewing the existing highway infrastructure. Nondestructive testing techniques can produce rapid inspection of new construction to facilitate timely reopening of a highway after reconstruction. NDT techniques can also be used to ensure the quality of construction required for long-term performance.

How can you learn more?

S2-R06-RW: *A Plan for Developing High-Speed, Nondestructive Testing Procedures for Both Design Evaluation and Construction Inspection* is available at the TRB Bookstore. To have a SHRP2 representative contact you about technical assistance or other information, contact Tom Yu, Tom.Yu@dot.gov; Kelley Rehm, Krehm@aashto.org; or Monica Starnes, mstarnes@nas.org.

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MANAGEMENT STRATEGIES FOR CHALLENGING PROJECTS

TOOLS TO INCREASE OPPORTUNITIES FOR INNOVATION AND DECREASE PROJECT RISKS

Focus area: Renewal (R09/R10)

PROBLEM: Rapid renewal projects typically involve complex logistical requirements, complicated contractual procedures, and restrictive regulatory requirements that need careful planning and execution from inception to construction completion. These complexities demand strong partnerships among transportation agencies, contractors, consulting engineers, and other stakeholders, who each take on different roles and need different skills to move beyond traditional approaches to highway construction. Additionally, these new conditions and methods require more effective risk management practices.

SOLUTIONS: With a goal to accelerate sound decision-making and reduce risks during rapid renewal projects, these products provide transportation agencies with tools they can use to develop innovative and effective project management strategies (R09/R10). The first guide presents a five-dimensional approach to project management that adds project context and funding mechanisms to the three standard factors of cost, schedule, and engineering requirements. A second guide specific to the demands of rapid renewal presents a formal risk management process to optimize project performance by planning for potential risks and potential opportunities. Finally, case studies and a companion training course are available to support adoption of the process.

BENEFITS: These products express the evolution of project management theories as tools for updating current practice. Using the five-dimensional approach, project managers identify issues that can be planned for and managed proactively. The five dimensions account for external factors instead of considering them risks; consider projects to be interactive rather than linear; schedule projects to create value; encourage innovation, hybrid contracting, and relational partnering; and emphasize that each complex project has its own set of performance goals uninhibited by history or conformity within the industry.

SCHEDULE AND CONTACT: Research is completed on Renewal projects R09 and R10. The guides and the final research reports will be available in 2012 at www.trb.org/PublicationsSHRP2. For information, contact Thomas Nelson, Thomas.Nelson@dot.gov; Jim Sinnette, James.Sinnette@dot.gov; LaToya Johnson, LaToya.Johnson@dot.gov; Keith Platte, kplatte@aashto.org; James Bryant, jbryant@nas.edu or Jerry DiMaggio, jdimaggio@nas.edu.

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REACHING AGREEMENT: RESOURCES FOR DOTS AND RAILROADS

REDUCING PROJECT DELAYS FOR DOTs AND RAILROADS

FOCUS AREA: RENEWAL (R16)

PROBLEM: North American railroads and public highway departments interact thousands of times a year as the highway agencies conduct projects that cross over, go under, or parallel the railways. Each interaction requires a thorough review of the safety, engineering, and operating effects that the project will have on the railroad during construction and for decades thereafter. Rapid highway renewal goals require a new approach that eases the project agreement process for both industries.

SOLUTIONS: A collection of recommended practices, model agreements, sample contracts, and training materials to help resolve the underlying sources of conflict. Using these resources, which will be centralized in an on-line library, the parties have the tools to negotiate a memorandum of understanding that lays out how they want to conduct the review process, develop draft model agreements and streamlined permitting language, or adopt a "continuous improvement" framework to the agreement process that allows performance tracking and collaboration for improvement. These steps, together with practices drawn from partnering, good project management strategies, and process improvement efforts, expedite the review process. A follow-on project is under way to establish a community of interested professionals to document and share successful practices and help move them into the mainstream.

BENEFITS: Resources that streamline permitting processes and support cooperative and constructive interaction between public highway departments and railroads can speed project delivery and reduce the costs of delay and conflict.

SCHEDULE AND CONTACT: Research is complete and the report is published as *Strategies for Improving the Project Agreement Process Between Highway Agencies and Railroads*. Follow-on projects to conduct pilot tests with pairs of partners and to establish a professional community of interest are active.

For more information contact Jon Obenberger, jon.obenberger@dot.gov; Keith Platte, kplatte@aashto.org; or Monica Starnes, mstarnes@nas.edu.

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DURABLE COMPONENTS FOR LONG-LIFE BRIDGES

FOCUS AREA: RENEWAL (R19A)

NEXT-GENERATION BRIDGE COMPONENTS HELP REDUCE COSTS AND TRAFFIC DELAYS

PROBLEM: Deterioration of individual bridge components such as bearings, deck joints, columns, and piles can require frequent and costly maintenance and difficult-to-conduct inspections. These activities increase lane closures and work zones, which have congestion costs and safety implications for both workers and road users. Some commonly used bridge components have inherent design flaws and limitations, but are still included in current design procedures and specifications. Bridge designers need better options to design bridge systems that could deliver 100 years or more of service life.

SOLUTION: A guide to designing next-generation bridge systems and subsystems for service life. The *Service Life Design Guide for Bridges* (R19a), a comprehensive reference document, complements AASHTO specifications and equips designers to develop specific solutions for given conditions and constraints. The focus is on typical bridges – bridges with one or multiple spans, with a maximum single span length of 300 feet. The Guide addresses design, fabrication, construction, operation, maintenance, repair, and replacement issues and applies to both new and existing bridges. It includes standard plans, model specifications for design and construction, detailed examples, and fault tree flow charts.

BENEFITS: Providing longer service life by design through state-of-the-art materials, construction techniques, and emerging technologies is a feasible way to function under fiscally restrained conditions. The cost of addressing service life issues at the design stage is significantly lower than taking maintenance and preservation actions while the bridge is in service. The Service Life Guide for Bridges is the basis for evolutionary change in designing for service life that results in longer-lasting bridge components that are easier to inspect and suited to their environment—factors that reduce maintenance, lane closures, and work zones.

SCHEDULE AND CONTACT: Both the final report for project R19A and *The Service Life Design Guide for Bridges* will be published and available online by mid 2013. For more information, contact Anwar Ahmad, anwar.ahmad@dot.gov; Kelley Rehm, krehm@aashto.org; or Monica Starnes, mstarnes@nas.edu.

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COMPOSITE PAVEMENT SYSTEMS

NEW REASONS FOR CONFIDENCE IN COST-SAVING PAVEMENT STRATEGIES

Focus area: Renewal (R21)

PROBLEM: Pavements that combine layers of asphalt and concrete have been proven to have long service life with excellent surface characteristics, structural capacity, and the ability to be rapidly renewed. But new composite pavements are not widely used in the United States. Transportation agencies need guidance, specifications, objective and reliable performance data, and life-cycle cost analyses to support use of these systems.

SOLUTIONS: SHRP2 has developed and validated mechanistic-empirical performance models and design procedures consistent with the Mechanistic-Empirical Pavement Design Guide (MEPDG). The models and design procedures will support the design and construction of new composite pavement systems (R21The guide focuses on two composite pavement design strategies: high-quality, relatively thin hot-mixed asphalt surfacing over a new Portland cement concrete (PCC) structural layer; and high-quality, relatively thin PCC surfacing over a thicker, structural PCC layer. Practical recommendations for construction specifications and techniques, life-cycle costing, and training materials were developed for both strategies based on research and test sections in Minnesota and California, and on the Illinois Tollway.

BENEFITS: With the guidelines, techniques, and specifications developed in this guide, composite pavement systems can be designed with confidence that they will produce lasting pavements with lower life-cycle costs. These strategies go a long way toward the goal of building roadways with lower life-cycle costs while at the same time leveraging maximum benefit out of the assets.

SCHEDULE AND CONTACT: The research for project R21 is complete and the results will be published in two volumes in mid 2013. The *Mechanistic Empirical Pavement Design Guide* will be submitted to AASHTO for consideration to incorporate the improvements into the DARWin-ME software. In addition, bug fixes and improvements related to both types of composite pavements (e.g., crack opening error in HMA/CRC) made to the MEPDG software during the research have been already incorporated into the DARWin-ME software. For more information, contact Thomas Van, Thomas.van@dot.gov; Keith Platte, kplatte@aashto.org; or James Bryant, jbryant@nas.edu.

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Using Existing Pavements in Rapid Renewal Projects

New guidelines help agencies use existing pavement for rapid and cost-effective renewal

State and local transportation agencies continue to seek innovative ways to speed up the delivery of needed infrastructure improvements at lower costs. New research from the second Strategic Highway Research Program offers new guidance for incorporating existing pavement into rapid renewal pavement projects with cost-effective results.

The new guide identifies the optimal conditions for using existing pavements within a pavement design and the best approaches for ensuring a longer usable life when they are incorporated. These pavements have the potential for a service life of up to 50-years and can reduce the need for more costly and time-consuming reconstruction projects using all new materials. The end results are pavements that last longer, cost substantially less, and can be constructed more quickly.

This SHRP2 Solution combines technical information and rational evaluation strategies, which can lead to extended pavement life while reducing traffic impacts and delays.

Using Existing Pavement in Place and Achieving Long Life

The Solution

This report provides much-need guidance for deciding where and under what conditions to use existing pavement as part of roadway renewal projects. It includes approaches for using existing pavements in-place to ensure longer service life for roadways using asphalt, concrete, and other innovative materials. It also identifies new alternatives to renewal approaches.

The report:

- Describes the range of approaches for using existing pavement in renewal projects
- Describes the advantages and disadvantages of each approach and under what circumstances each should be considered
- Describes construction techniques
- Outlines the method for integrating recycled concrete with adjacent materials and road structures.

Extending pavement life while reducing costs to reconstruct the nation's busiest roads

Focus Area: Renewal (R23)

Easy-to-follow guide for incorporating existing pavements into rapid renewal road construction projects.

Save Lives

- Shorter construction periods reduce risks and enhance safety for the traveling public and construction workers.

Save Money

- Reuse reduces the amount of new pavement and shrinks construction timelines.
- Saves hauling and dumping fees

Save Time

- Accelerates projects by reusing existing pavement, alleviating the need to remove and dispose of it offsite.
- Reduces traffic delays for the traveling public as a result of shorter construction windows.

The Benefits

This guide helps state DOTs make better decisions with regard to pavement renewal projects by using existing pavement as part of the design where appropriate. Departments of transportation, drivers, highway workers, contractors, and taxpayers will benefit from:

- Time savings based on rapid reuse of existing materials;
- Cost savings from reduced need for new pavement and a shorter construction phase;
- Safety benefits due to reduced exposure of travelers and construction workers to potential work zone hazards;
- A better return on investment for the public based on a longer pavement service life; and
- Reduced environmental footprints, based on decreased production of pavement.

How has this strategy been used by states?

By applying this method, for example, it is estimated that the Washington DOT will realize a 30% cost savings and a 50% reduction in user delay cost over the life of the new pavement. This approach delivers long-lasting value by promoting durable and dependable roads.

How can you learn more?

To have a SHRP2 representative contact you about technical assistance or other opportunities to use these preservation guidelines, contact Steve Mueller, Steve.Mueller@dot.gov; Keith Platte, kplatte@aashto.org; or James Bryant at jbryant@nas.edu.

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Preserving Our Heavily Traveled Roadways

New guide identifies best options to preserve and maintain high-volume roadways

Stretching the time between major rehabilitation projects can save transportation agencies money, reduce congestion, and improve safety. New SHRP2 research has confirmed that many of the same preservation techniques used on lower-volume roadways can extend the pavement life of heavily traveled highways, both in rural and urban areas, and with less risk. A new guide developed from the research now offers decision-makers a step-by-step process to identify the best technologies to meet their specific needs.

Preservation Guidelines for High- Volume Roads

The Solution

Guidelines for the Preservation of High-Volume Roads and its companion report*, Preservation Approaches for High-Traffic Volume Roadways,* are designed to help agencies identify the best options to preserve and maintain heavily traveled roadways. The matrix greatly simplifies the numerous and often complex factors that drive decisions about pavement rehabilitation, and provides a step-by-step sequencing for weighing the various technical inputs and selecting treatments most appropriate for higher-volume roads.

Developed through the Transportation Research Board and the second Strategic Highway Research Program, this SHRP2 Solution combines technical information and rational evaluation strategies that can lead to extended pavement life while reducing traffic impacts and delays.

The Benefits

The immediate **benefits of the guide** are better decision making and smarter selection of the best treatments. A better selection process leads to less risk in trying new treatments. **The benefits of improved preservation techniques** (R26) on heavily-traveled roadways lead to:

- Shorter-duration maintenance and rehabilitation
- Reduced congestion and cost savings by extending pavement service life and making reconstruction less frequent
- Increased safety by addressing minor deficiencies before they become hazardous
- Longer intervals between costly large-scale rehabilitation projects while providing an optimal ride.

Extending the service life of the nation's busiest roads

FOCUS AREA: Renewal (R26)

Easy-to-follow guide to making the best pavement preservation decisions for high-volume roadways.

Save Lives

- Reduces the frequency of major pavement reconstruction.
- Reduces the frequency of work zone crashes.

Save Money

- Enables agencies to stretch scarce transportation dollars and reduce risk through better selection process.

Save Time

- Matrix simplifies the process and leads to quicker decisions; efficient techniques reduce the amount of time lanes are closed for lengthy rehabilitation or reconstruction.

Who is using preservation techniques on high-volume roadways?

- Washington State DOT used chip seals on the Tacoma Narrows Bridge with an average daily traffic (ADT) of 178,000.
- Georgia DOT has used crack seals, single-course microsurfacing, overlays and mill/overlays on urban roadways that see 10,000 or more ADT.
- Texas DOT uses cape seals, polymerized chip seals, and ultrathin overlays as well as other treatments on their rural roads with greater than 5,000 ADT.
- South Dakota DOT uses fog seal, ultrathin bonded wearing course and cold in-place recycling as well as other preservation treatments on their rural roads with greater than 5,000 ADT.

What your colleagues have to say:

"This tool is about opportunity; this tool is giving the states a portfolio of options and choices. I think this tool will help us redefine how we do our decision making in terms of infrastructure management."

Andrew Williams, Ohio Department of Transportation

"If you can keep your treatment costs down for a longer period of time and push out those major rehabs then you've saved very real dollars."

Judith Corley-Lay, North Carolina Department of Transportation

"We need to be expanding our thinking in terms of how we take care of our roads and this is one of the tools to help us do that."

Chris Bauserman, president, National Association of County Engineers

How can you get involved or learn more?

To have a SHRP2 representative contact you about technical assistance or other more information contact Thomas Van, Thomas.van@dot.gov; Keith Platte, kplatte@aashto.org; or James Bryant, jbryant@nas.edu. *Preservation Guidelines for High-Traffic-Volume Roads* and *Preservation Approaches for High-Traffic Volume Roadways* are available online and at the TRB Bookstore http://www.trb.org/Finance/Bookstore.aspx.

SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

About SHRP 2 Implementation

The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation's highway system.