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.

About SHRP 2 Implementation

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SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

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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STRATEGIC HIGHWAY RESEARCH PROGRAM

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SP-12-003-02

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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PERFORMANCE SPECIFICATIONS FOR RAPID RENEWAL

SPECIFY THE RESULTS YOU WANT AND WATCH INNOVATION HAPPEN

Focus area: Renewal (R07)

PROBLEM: Traditional method specifications can be a barrier to the innovation needed to achieve the objectives of rapid renewal. Instead, performance specifications that emphasize desired results are needed to motivate and empower the contracting industry to provide creative solutions that result in faster project delivery, minimal disruption, and greater durability.

SOLUTIONS: To help transportation agencies develop and implement performance specifications, the second Strategic Highway Research Program (SHRP 2) has developed model performance specifications for various project types (e.g., pavements, geotech, bridge, etc.) and project delivery methods (e.g., design-bid-build, design-build, design-build-warranty, design-build-operate-maintain). Implementation guidelines have also been developed. They address issues related to project selection, specification development, procurement, and the various other cultural and organizational changes necessary, both within an agency and the industry as a whole, to support the implementation of performance specifications across a wide spectrum of work and projects.

BENEFITS: Specifying the desired performance of roads and bridges can accelerate construction, enable greater control and ingenuity by construction contractors in deciding how to build, reduce costly construction oversight, and use construction management resources more effectively. Performance specifications have evolved in many directions, some more effective than others. This product provides the tools to owner agencies to reduce claims, reduce inspection costs, and accelerate construction.

SCHEDULE AND CONTACT: The research concludes in late 2012. The final report, available in 2013, will include guidelines for ranking important project parameters (such as time, quality, cost, risk, and complexity) and specifications for different highway renewal scenarios (for example, road, bridge, structures, traffic control) and guidelines for their implementation. The specifications will also be available in an electronic version. For information, contact Jennifer Balis, Jennifer.Balis@dot.gov; Lee Gallivan, victor.gallivan@dot.gov; Jim McDonnell, jmcdonnell@aashto.org; or James Bryant, jbryant@nas.edu.

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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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Seamlessly Integrating Utility Company and Transportation Agency Needs

New tool identifies options for documenting, solving and managing utility conflicts to simplify and speed coordination between transportation agencies and utility companies

State DOTs and local agencies have developed innovative approaches to minimize construction-related delays and congestion. However, significant problems related to utilities continue to plague the design and construction process, slowing construction and adding significantly to project costs. Locating buried utility lines in the right-of-way and relocating above ground wires, poles, and equipment often cause costly delays for construction projects and expensive rework for utility companies.

New SHRP2-developed guidelines should alleviate many of these problems and produce greater efficiency. The matrix-based guidelines allow agencies and utilities to quickly identify and resolve conflicts between road and bridge projects and the presence of utility infrastructure.

Integrating the Priorities of Transportation Agencies and Utility Companies

The Solution

The Utility Conflict Matrix (UCM) and its companion report*, Integrating the Priorities of Transportation Agencies and Utility Companies,* are designed to help agencies and utility companies quickly identify best solutions. The matrix is scalable to support of a range of project sizes and conditions. The easily accessible information helps all parties to make informed decisions, and features a description of best practices from selected DOTs using Utility Conflict Matrices derived from the results of surveys of utility companies and DOTs and case studies that identified prevailing issues and proven solutions. The SHRP2 product also includes training, a procedural manual and implementation guidelines.

The Benefits

The immediate **benefits of the guide** are simplified identification of conflicts and solutions. The process also fosters greater communication among affected parties. Together, these improvements lead to a more efficient process. Ultimately **the benefits of more effective utilities coordination** on roadway and bridge construction include:

- Time and cost savings from reduced utility conflict delays

Improving utility coordination on highway projects

Focus Area: Renewal (R15B)

Easy-to-use tool for identifying and resolving utility-related conflicts in construction.

Save Lives

- Timely location of underground lines in the right-of-way removes potential safety issues.

Save Money

- Earlier and more efficient coordination reduces costs from construction delays.

Save Time

- Standard procedures and easy-to-use tools save time in identifying and solving utility conflicts—and in turn save time resulting from fewer construction delays.

- Improved project development procedures based on anticipating and resolving utility conflicts
- Safety benefits from fewer utility conflicts
- Better communication among transportation agencies and utilities
- Reduced impacts on the public from construction related delays or congestion.

Who is using these tools?

- Georgia DOT uses a utility impact matrix on every project involving utilities and offers programs for training designers in utilities coordination.
- Both Florida DOT and Georgia DOT have developed protocols for Electronic Plan Transfer, the use of electronic files and file transfer protocols to communicate highway project status to affected utility companies and to maintain archives.
- Wisconsin has developed a statewide common Transportation Utility Management System (TUMS) for tracking, locating, and management systems.
- Texas DOT also developed a tool showing each activity of the right-of-way acquisition and utility adjustment process with the corresponding responsible parties separated into three categories: TxDOT ROW Division, TxDOT ROW district, and project associates. This tool helps in planning activities and keeps participants updated on the process. It also offers a method and format for recording data. North Carolina DOT is collecting similar data.

How can you learn more?

Report S2-R15-RW: *Integrating the Priorities of Transportation Agencies and Utility Companies* is online at http://www.trb.org/Publications/Blurbs/161801.aspx. To have a SHRP2 representative contact you about technical assistance or other opportunities to use these preservation guidelines, contact Jon Obenberger, Jon.Obenberger@dot.gov; Keith Platte, kplatte@aashto.org; or James Bryant at JBryant@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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DESIGNING NEXT-GENERATION BRIDGES THAT LAST FOR 100 YEARS

NEXT-GENERATION BRIDGE COMPONENTS AND SYSTEMS HELP REDUCE COSTS AND TRAFFIC DELAYS

FOCUS AREA: RENEWAL (R19A)

PROBLEM: Deterioration of individual bridge elements such as bearings, decks, expansion joints, girders, columns, and piles can require frequent and costly maintenance, repairs, or replacements. These activities typically require lane closures and work zones, which produce costs and have safety implications for both workers and road users. Some commonly used design details have limitations but are still included in current design procedures and specifications. Bridge designers need more and better options to design bridge systems that could deliver 100 years or more of service life.

SOLUTIONS: A guide to designing next-generation bridge systems and subsystems for service life. The *Service Life Design Guide for Bridges* (R19a), a new reference document, complements AASHTO specifications and equips designers to develop specific solutions for given conditions and constraints. 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 durable and state-of-the-art materials, construction techniques, and emerging technologies is a feasible way to function under fiscally restrained conditions. Addressing service life issues at the design stage will result in significant cost savings in maintenance and preservation actions while the bridge is in service. *The Service Life Design Guide for Bridges* provides engineers with tools to select and design for longer-lasting bridge systems and subsystems for the appropriate environment. They result in longer-lasting bridge components that are easier to inspect and are better 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 Tom Yu, Tom.Yu@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.