SHRP Technologies
Saving Money, Time, and Lives

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It has been more than a decade since a study conducted by the Transportation Research Board laid the groundwork for the Strategic Highway Research Program (*1*), and much has happened since then. The legacy of the program itself includes more than 100 new specifications, technologies, and devices for improving highway construction and maintenance operations (*2*). A nationwide effort to help those products cross the bridge between research and implementation is well under way, spearheaded by the American Association of State Highway and Transportation Officials and the Federal Highway Administration. Standards are being revised to accommodate the changes wrought by the new technologies, training programs are being updated to cover the new specifications and devices, and manufacturers and suppliers are incorporating the new devices in their product lines.

By many measures, the Strategic Highway Research Program could be considered a success. But two questions linger. What is the return on the $150 million investment in SHRP? Should this type of broad research initiative be a model for future research programs?

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At its fall 1994 meeting, the TRB-SHRP Committee pondered these questions. SHRP had been the largest, most focused highway research program ever conducted. It was based on the premise that even small improvements in highway construction and maintenance practices could generate significant paybacks. Clearly some sort of assessment project was needed to determine if the money invested in SHRP was indeed well spent.

In 1995, acting on a recommendation from the TRB-SHRP Committee, the Federal Highway Administration initiated a project to investigate how SHRP products were being used and to determine if the program had been a wise investment. For the first step of this project—collecting information on use of SHRP products by highway agencies—FHWA enlisted the help of the transportation technology transfer centers in Nevada, Florida, Indiana, Minnesota, Pennsylvania, and Texas. Phone and mail surveys were conducted to determine what states were using what SHRP products.

The administration then contracted with the Texas Transportation Institute (TTI) for the second step: analyzing the data collected by the program and preparing a report detailing the benefits versus the costs. The institute's analysis was conducted by a team of engineers and economists, who studied how the implementation of SHRP products would affect both highway agencies and motorists.

Research to Bank On

The results are in—and the news is good for highway agencies and researchers, and even better for taxpayers (*3*). The money invested in SHRP will be paid back many times over. Many of the technologies developed and evaluated by the program are already being used by state and local highway agencies to build pavements that will last longer, lessen the effect of winter maintenance operations on the environment, protect highway work crews, assess bridge conditions more cost-effectively and efficiently, and extend the life of existing pavements. Motorists are also benefiting from fewer maintenance-related delays, less wear and tear on their vehicles, and safer travel.

The assumptions used in TTI's economic analysis are, for the most part, extremely conservative. The institute assumed, for example, that only 25 percent of all pavement overlays would benefit from the use of the new Superpave binder specification and that the service life of those overlays would increase by only 25 percent. Yet over a 20-year period, those improvements could generate a total annual savings in agency and user costs ranging between $1.8 billion and $2.9 billion, depending on the pace of implementation.

TTI also found that switching to the pothole-patching technologies and materials recommended by SHRP is a sound decision. Highway agencies at the state and local levels spend upward of $1 billion each year patching potholes. The institute conservatively estimated that implementation of the pothole-patching methods advocated by SHRP could yield a savings in agency and user costs between $24 million and $89 million annually, again depending on how quickly the technologies are implemented.

A SHRP recommendation in the pavement maintenance area—that preventive maintenance treatment be applied to a pavement after seven years of service, followed by a second application seven years later—contrasts with the conventional agency practice, primarily driven by a lack of funds, of applying preventive maintenance treatments much later in a pavement's life. The delay in preventive maintenance only hastens the need for an overlay. In the analysis, calculation of the economic benefits on the basis of the use of slurry seals and chip seals alone revealed that the higher costs incurred from more frequent preventive maintenance treatments were offset by the less frequent need for overlays. The potential cost savings range from $270 million to $1 billion per year, depending on the pace of implementation.

Winter maintenance costs consume a huge portion of highway agencies' maintenance budgets, totaling more than $2 billion annually. The Texas Transportation Institute estimated that if the anti-icing strategies recommended by SHRP were fully implemented nationwide, winter maintenance costs could be cut by more than one-third owing to more efficient use of crews, equipment, and materials. Many states are already realizing such savings. Nevada, for example, has found that an anti-icing strategy coupled with a road-weather information system is making maintenance work more effective and reducing staffing and equipment requirements. The state is expanding its road-weather information system and expects to save more than $7 million over the next 25 years.

If states adopted just 6 of the 44 concrete test products evaluated or developed by SHRP, they could save anywhere from $4.1 million to $15.5 million annually over 20 years, according to the TTI analysis. Alaska, for example, has found that switching to the chloride-content test kit to assess the condition of steel-reinforced bridges is saving the state $1,400 per bridge assessment. In the first 18 months of use, the $2,000 test kit resulted in cost savings of $95,000. TTI also reported that SHRP's products for mitigating D-cracking and alkali-silica reactivity in portland cement concrete could generate a total savings ranging from $51 million to $191 million annually.

SHRP's work-zone safety devices are being implemented more quickly than its other products. Of the 10 such devices, 8 are readily available from a number of suppliers, and several are already in widespread use. By improving safety in temporary work zones, which usually lack the more formidable protective devices found in longer-term construction zones, these devices help save lives.

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Anti-icing strategies (used on lanes at left) not only make travel safer but also save money for states by increasing effectiveness and efficiency of maintenance operations.

Two of the more widely used work-zone safety devices—the flashing Stop/Slow paddle and the opposing traffic-lane divider—were assumed to reduce the number of accidents by 5 percent. According to the National Highway Traffic Safety Administration, 14 percent of work-zone fatalities involve construction workers and 86 percent involve motorists. TTI used these figures to calculate annual savings to highway agencies nationwide of $2.1 million to $4.1 million and to highway users between $15 million and $30 million.

Real Numbers

These potential savings are substantiated by more than 100 case studies. Each study describes a state's experience with a SHRP product—the reason for using the product and the findings. Published under the SHRP RoadSavers banner, the case studies are being distributed to highway agencies, the media, elected leaders, and others.

Together, the case studies and the economic analysis by the Texas Transportation Institute affirm that the $150 million Strategic Highway Research Program was a wise investment. The potential payoffs are great—as many states are learning firsthand.

The findings also point to the wisdom of Congress, which earmarked funds for SHRP implementation in the 1991 Intermodal Surface Transportation Efficiency Act. Without those implementation funds, many of the SHRP products would likely still be sitting on the shelf rather than being put to their intended use—improving infrastructure performance and highway safety.

References

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2. *SHRP Product Catalog.* Strategic Highway Research Program, National Research Council, Washington, D.C.
3. Epps, J. *Economic Benefits of SHRP Research.* Research Report No. 96-7. University of Nevada–Reno.