Feds Push More Use Of Pavement Preservation

Economics is driving the FHWA's increased willingness to fund cost-efficient pavement preservation treatments such as this chip seal operation.

Economics drives funding boost for transportation asset management decision making, a move that could profoundly change construction and operations

By Paul Fournier

As state and federal tax revenues slated for transportation construction have continued to shrink, a quiet evolution has taken place in highway management decision making. This important development, underway by Congress and the Federal Highway Administration (FHWA) since the mid-1970s and focused by The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA),) has transformed a highway program of construction and re-construction to one of preserve, maintain and operate.

It represents a dramatic shift in FHWA's position on funding preventive maintenance treatments from the early days when these treatments were deemed ineligible for federal money. And it now heralds a major departure for the construction industry while holding promise for cutting an estimated backlog of $500 billion worth of unfunded but needed highway and bridge repairs and reconstruction.

For years FHWA was focused primarily on new construction, rehabilitation and re-construction. Preventive maintenance treatments, especially thin ones, were considered strictly maintenance and not a federal responsibility. When federal aid was later extended to cover some maintenance activities by The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), 80 percent of the aid was allotted for the reimbursement of preservation costs. All Federal aid can now be applied for constructing, preserving and operating a safe and economical highway network.

FHWA continued to modify policy around highway asset preservation and economic decision making with the lessons learned by studies conducted under the Strategic Highway Research Program (SHRP) of the Transportation Research Board.

A Lesson Learned

"We learned you could preserve the road if you selected the right preventive maintenance treatment at the right time for the right road," said Jim Sorenson, senior construction and preservation engineer for FHWA's Office of Asset Management. The 38-year agency veteran said the SHRP studies examined a number of surface treatments including crack sealing, ultra-thin hot mix asphalt pavements, slurry seals, chip seals and even a do-nothing approach.

During the 1990s, the applicability of FHWA aid for preventive maintenance treatments was broadened considerably through congressional legislation, and the agency clarified this eligibility through a series of memorandums. Arguably the most far-reaching memo was released by the agency in October, 2004.

This memo reflected a sea change in the way FHWA regarded preventive maintenance treatments. It stated unequivocally that preventive maintenance extends the service life of a road in a cost-effective manner and therefore was eligible for Federal-aid funding. It further explained that preventive maintenance activities eligible for federal-aid are those that address aging, oxidation, surface deterioration, and normal wear and tear from day-to-day performance and environmental conditions.

Partnering With States

Pointing out that preventive maintenance offers the states a way to increase the return on their infrastructure investment, the memo encouraged FHWA field offices to promote preservation and work closely with their counterparts in the states departments of transportation. As part of this effort, it suggested FHWA offices work with their state partners to establish a "preservation" component of preventive maintenance, listing as examples of preservation such activities as joint repair, seal coats, pavement patching and thin overlays, among others.

Since the October 2004 memo the agency's position on pavement preservation has continued its slow but inexorable 180-degree turn, and now reportedly considers allocating an even greater percentage of highway funds to pavement preservation techniques particularly given the nation's current economic situation.

Micro surfacing using asphalt emulsion with SBR latex is demonstrated on Minnesota Route 55 as part of Midwestern Pavement Preservation Partnership meeting.

Thin-lift asphalt pavement preservation treatment incorporating warm-mix technology and polymer-modified emulsion is demonstrated on a Salem, Mass., arterial.

Economics Drives Change

FHWA now encourages states to maintain and preserve the roads they have, not provide incentive for them to wait until roads deteriorate so badly they have to be totally reconstructed, said Sorenson. "This worst-first scenario is just too expensive and not the way to go."

"Today, economics is the stimulus for preserving roads. There's no money to reconstruct everything. It's no longer 'do the worst roads first,'" he said. He added that the benefit-to-cost ratio for pavement preservation far exceeds that of reconstructing a road that has been allowed to deteriorate too long. There is general industry agreement that for every $1 currently invested in preservation, there is a $6 return in extended service life.

FHWA's conversion to the pavement preservation doctrine has been incremental, the result of 25 years of soul-searching, legislation enacted by Congress in the form of transportation funding bills, and a series of memos from top agency officials that continually updated and clarified the feds' position.

Defining Pavement Preservation

FHWA's September 12, 2005 policy memo spells out its position on pavement preservation in a memo to administrators, field service directors, division administrators and division engineers of Federal Lands Highways (www.fhwa.dot.gov/pavement/preservation/091205.cfm).

"Pavement preservation represents a proactive approach in maintaining our existing highways," said the author, David R. Geiger. "It enables state transportation agencies to reduce costly, time consuming rehabilitation and reconstruction projects and the associated traffic disruptions." He further stated that pavement preservation activities restore the function of the existing system and extend its service life, not increase its capacity or strength.

Chip spreader applies stone over asphalt emulsion during the chip sealing of a residential subdivision near the City of San Antonio, Texas.

Drawing on a number of FHWA sources, the memo pointed out that an effective pavement preservation program addresses pavements while they are still in good condition, before the onset of serious damage. By applying a cost-effective treatment at the right time, it stated, the pavement is restored almost to its original condition. The cumulative effect of aging, weather and abrasion is postponed, and the pavement can continue to provide a safe, smooth and cost-effective service to the taxpayer. This proactive and systematic preservation treatment postpones costly rehabilitation and reconstruction.

It further noted that pavement preservation consists of three components: preventive maintenance, minor rehabilitation (non structural), and some routine maintenance activities. Examples of preventive treatments included asphalt crack sealing, chip sealing, slurry or microsurfacing, thin and ultra-thin hot-mix asphalt overlay, and others.

A Strong Advocate

FHWA's Sorenson has spent much of his time in recent years as a strong advocate of pavement preservation, explaining these principles to various segments of the transportation construction industry. In line with this, he partners with state DOTs and works closely with organizations that are promoting the concepts of systems preservation. One of the most effective groups is the National Center for Pavement Preservation (NCPP).

Founded in July 2003 by Michigan State University and the Foundation for Pavement Preservation, the Center works with government agencies, industry and academia to advance and improve pavement preservation practices through education, training, research and outreach. NCPP makes its engineers available on request for educational and informational seminars, and maintains a collection of preservation-related technical documents on its website, www.pavementpreservation.org.

As the public agency demand for system preservation has increased, the American Association of State Highway and Transportation Officials (AASHTO) developed a state-funded Transportation Systems Preservation Technical Services (TSP.2) center to foster cooperation among private industry, academia, consultants, and federal and state agencies. This center has been contracted through NCPP. At present, four groups have been formed: the Midwestern Pavement Preservation Partnership (MPPP), The Northeast Pavement Preservation Partnership (NEPPP), the Southeastern Pavement Preservation Partnership (SEPPP), and the Rocky Mountain Pavement Preservation Partnership (RMPPP).

Working With Industry

As part of its activities, NCPP is conducting a study for FHWA and its Federal Lands Highway Division (FLHD) on polymer-modified asphalt emulsions. The Polymer-Modified Emulsions (PME) study is expected to help officials decide what types of modifiers and additives to blend with the asphalt binders used in surface treatments. Included in the study is a review of current practices and specifications for these polymer-modified emulsions, which are increasingly being used in pavement preservation projects. This study also involves nationwide testing of materials used on such projects.

Private industry is providing pro bono and at-cost testing for the study. Samples of aggregate and emulsions from a number of selected projects are being sent to laboratories of BASF Corporation, PRI Asphalt Technologies Inc., and Paragon Technical Services Inc. BASF Corporation is funding the at-cost material testing, in conjunction with NCPP.

Changes In Store

The fundamental change in FHWA's approach to the funding of pavement preservation applications, coupled with the cooperation of private industry and academia plus efforts of groups like NCPP, AASHTO and others, are expected to have a profound effect on transportation asset management in the years to come.

Driven by economics -- exacerbated by a deep recession -- major transformations in the kinds of construction materials and equipment and even types of contractors and engineers involved may result as billions in federal aid are made available for pavement preservation. ■