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RESEARCH
SERVICES SECTION

TECHNICAL SUMMARY

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IMPLEMENTATION PROJECT COST:
$18,848

A new chapter of the handbook is devoted to chip sealing trails, where a smooth surface can prevent accidents and provide a more comfortable ride.

LRRB
LOCAL ROAD RESEARCH BOARD

Putting Research into Practice: Minnesota Seal Coat Handbook 2006

What Was the Need?

Exposure to sun, wind and water can cause asphalt pavement to become brittle and crack over time. In addition, as traffic wears away the pavement's surface (through a process called raveling), the roadway can become slippery. Most of Minnesota's cities, counties and rural districts combat these problems with seal coating, which involves spraying emulsified (water-suspended) asphalt cement on the pavement and then covering it with a layer of gravel or crushed aggregate (such as granite or basalt).

Responding to widespread seal coat failures in the Minneapolis-St. Paul areas in the early 1990s, Mn/DOT conducted studies to examine seal coating problems and best practices; this resulted in the publication of the Minnesota Seal Coat Handbook in 1998. Its purpose was to provide a solid background in seal coat materials, equipment, design and construction for designers and field personnel. The manual became one of the most widely referenced handbooks within Mn/DOT; it led to a great leap forward in the quality and consistency of seal coating in Minnesota and served as a model nationally.

There have been significant advances in the seal coating process since 1998 that made it difficult for local governments to keep up with the latest technology. Moreover, the handbook had opened up a whole field of possibilities that introduced additional questions. There was increasing interest, for instance, in seal coating trails and parking lots, which were not covered by the handbook.

What Was Our Goal?

The objective of this implementation effort was to maximize the value of Mn/DOT's investment in the original handbook and in subsequent seal coating research by updating the handbook in light of recent Mn/DOT studies, specifications and field experience. This update would be accompanied by a training module for state and local government personnel.

What Did We Implement?

This project made maximum use of the original handbook; everything still accurate from this source is retained in the new edition. An important source for the new edition was a seal coat Special Provision issued by Mn/DOT to update its specifications in light of the original handbook. A key research project that fed into the update was the December 1999 report "Seal Coat Research Project," in which investigators evaluated seal coating as a method to protect bituminous pavements from oxidation, water infiltration and raveling. This study investigated several specific areas of failure—design, equipment calibration, materials and technique—and developed optimal requirements for seal coat application.

How Did We Do It?

Investigators conducted a literature search to identify all sources of updates for the handbook, reviewed the existing handbook text to determine what information was no longer valid or current, and identified new areas and topics to be added. The handbook was then updated to take into account advances in the seal coating process, including:

- Improved seal coat emulsions
- Changes to best practices in aggregate gradation for premium seal coats

continued

"This project took a great resource and updated it to include new materials, specifications and processes."

–Michael Marti,
Principal, SRF Consulting Group Inc.

"The original handbook was Seal Coating 101, aimed at people who had previously had bad experiences with the practice. The update was to take that audience to the next level in seal coating and broaden their applications of this technology."

–Mark Maloney,
Public Works Director, City of Shoreview

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Fog sealing, discussed in the updated handbook, can rejuvenate a road with a light spray of diluted asphalt emulsion. This increases pavement life, and the public perceives the darkened road as a new asphalt surface.

- Newly available technology, including macro-surfacing, which involves a single seal coat application with specialized equipment using an engineered emulsion and a cubical stone
- New practices that combined seal coating techniques to yield a better surface treatment

This new information required new handbook chapters, including one on fog sealing (applying a layer of emulsion on top of new chip to help hold the aggregate in place), one on chip sealing for recreational trails and a chapter answering frequently asked questions.

After completing the handbook update, investigators created a two-hour course providing an overview of this new resource for deployment through the Minnesota Local Technical Assistance Program.

What Was the Impact?

The handbook update was widely distributed, with hard copies sent en masse to city and county engineers, and an electronic version posted for access worldwide. This resource was heavily publicized by the Local Road Research Board and Minnesota LTAP. The course "Seal Coat Operations: A Workshop for Practitioners" was incorporated into the LTAP curriculum for ongoing use. On-the-spot course evaluations were very positive, with many officials eager to make use of the new technologies introduced.

What's Next?

Distribution of this valuable resource continues through the LTAP course and presentations by state and local officials involved with this effort. The course will be repeated every few years, with updates to cover new aggregate sources, new uses for recycled products and other seal coating advancements as they occur.

Mn/DOT Research Services is considering conducting after-the-fact surveys to gauge the degree to which the workshop facilitated changes in practice at the local level.

This Technical Summary pertains to the LRRB-produced Report 2006-34, "Minnesota Seal Coat Handbook 2006," published June 2006. The full report can be accessed at http://www.lrrb.org/PDF/200634.pdf. *The LTAP course listing for the Seal Coat Operations workshop can be viewed at* http://www.mnltap.umn.edu/Events/RoadwayBridgeMaintenance/SealCoat.html.

The research being implemented through this project can primarily be found in the LRRB-produced Reports 2000-03, "Seal Coat Research Project," published December 1999, and the previous version of the handbook, Report 1999-07, "Minnesota Seal Coat Handbook," published April 1998. These reports can be accessed at http://www.lrrb.org/PDF/200003.pdf *and* http://www.lrrb.org/PDF/199907.pdf, *respectively.*