



TECHNICAL SUMMARY

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PROJECT COST:

\$49,685



Sand patch testing involves spreading a set volume of sand to measure surface texture.



RESEARCH
SERVICES SECTION

Preventive Maintenance for Recreational Trails

What Was the Need?

Minnesota's nationally recognized regional park system contains more than 25,000 miles of city, county and state-owned recreational trails. These trails are vital to the quality of life of Minnesotans, providing exercise and recreation for walkers, runners, cyclists and inline skaters alike. The trails also play an important role in the economies of surrounding communities, increasing the attractiveness and property values of adjacent areas as well as attracting tourists and encouraging trail-related purchases such as bicycles.

The funds available for recreational trails are limited and over the last 20 years have been dedicated to new construction rather than maintenance. Consequently, there is a growing interest in low-cost preventive maintenance techniques that can extend the useful service lives of trails without compromising the quality of their surfaces. This task is especially challenging given the variety of users that trails accommodate. For example, while walkers can use relatively rough trails, inline skaters cannot. Further, current preventive maintenance techniques have been adapted from methods developed for highways and other roads without the average trail user in mind.

What Was Our Goal?

The goals of this project were to evaluate the effectiveness of available pavement preventive maintenance techniques for recreational trails, and to establish which treatment methods and sealants best balanced trail preservation with acceptable surface conditions for the widest variety of trail users.

What Did We Do?

Researchers first compiled a list of commonly used sealant products and surface and crack treatment methods that have been designed for the preventive maintenance of roadways but have also been applied to recreational trails. Surface treatments—such as fog seals, chip seals, slurry seals and microsurfacing—involve covering existing pavements with various kinds of asphalt emulsions and possibly adding an additional layer of gravel or crushed aggregate. Crack treatments involve various techniques for filling cracks with sealants. These treatments are designed to slow the damage caused by exposure of pavements to water and sunlight, which can oxidize and harden pavement binders, making surfaces brittle and prone to cracking and other deterioration.

In 2008, researchers applied selected treatments to 18 test sections, ranging in length from 150 feet to 1 mile, on seven recreational trails in Minnesota. These treatments were evaluated for ease of application; after application, they were evaluated in comparison to control sections for how effectively they sealed against water, how smooth or rough they made the resulting pavement texture, and how trail users felt about the new surface.

To establish how well pavements prevented the infiltration of water, researchers evaluated their permeability using a falling-head field permeameter, which measures how long it takes for a given amount of water to flow into a pavement. To evaluate how treatments affected surface texture, researchers used the ASTM E965 sand patch test, which reports the diameter of a uniformly spread volume of sand: Larger diameters correspond to less texture and smaller diameters to greater texture.

What Did We Learn?

Results showed that pavement preservation treatments normally used on streets and highways can be successfully modified for use on recreational trails. All of the treat-

continued

“This project gave us practical demonstrations in the field of the importance of using preventive maintenance techniques early on in the life of recreational trails. Doing so can significantly slow pavement aging over subsequent years.”

—Roger Olson,
Engineer, Mn/DOT Office
of Materials and Road
Research

“Because it gives personnel responsible for recreational trails additional tools for making cost/benefit maintenance decisions, this research has produced a lot of interest in Minnesota, and the potential audience for its results is worldwide.”

—Duane Schwartz,
Public Works Director,
City of Roseville

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Designed for roadways, many treatments must be modified for use on recreational trails. For example, chip sealing should be scheduled during the latter part of the summer when trails are at maximum strength and should use a reduced chip size to yield a smoother surface.

ments reduced the permeability of trail surfaces compared to control sections, and so are expected to reduce damage caused by sun and water. All spray-applied fog seals reduced permeability while decreasing pavement texture; this will extend the trail’s surface life. While chip seals increased pavement texture due to the addition of aggregate, they can be modified with a reduced chip size—such as sand—to limit this increase.

Researchers recommend preventive maintenance early in a pavement’s life while it is still in good condition, beginning at construction and continuing on a regular basis. An application at the time of construction, which can be done as part of the construction contract, seals initial surface voids, retarding aging until the next retreatment. Later re-sealing can be performed while sealing nearby streets to maximize economies of scale.

Because of the short-term nature of this study, researchers were unable to determine which treatment products would be most cost-effective over the pavement life cycle. All of the tested products resulted in a quality surface for users and are expected to help deter the effects of aging.

What’s Next?

An LRRB project is currently planned to create a training workshop on trail corridor management that will incorporate the results of this study.

Researchers recommend monitoring trails over the next three to five years to determine which treatments performed best. They also recommend further research to develop mix designs optimized for recreational trails and establish the most effective sealants for sealing trail cracks that can cause tripping and other safety hazards.

This Technical Summary pertains to the LRRB-produced Report 2009-25, “Preventative Maintenance for Recreational Trails,” published July 2009. The full report can be accessed at <http://www.lrrb.org/PDF/200925.pdf>.