Preventive Maintenance for HMA Recreational Trails

Introduction
The recreational trail system owned and maintained by governments and park administrations has increased dramatically in recent years. Resources have historically been focused on the initial planning and construction of the trails, with little, if any, emphasis on the long term maintenance of the pavement.

The increased cost of construction and materials has prompted agencies to seek out methods to effectively maintain high levels of service without the high costs of reconstruction. Preventive maintenance (PM) has become a widely accepted means of realizing this goal, however this has, until recently, been focused on automotive pavements. This research project sought to identify and apply various innovative and traditional preventive maintenance treatment options to recreational trails, while considering the various needs of the diverse trail user groups and the vital role of recreational trails in the transportation network.

Recreational trails are becoming increasingly more important as an integral part of the multi-modal transportation network. These trails oftentimes serve many purposes including: commuter routes, safe routes to school, places for exercise and relaxation. These trails are also depended upon by an increasingly diverse group of users that include: bicyclists, in-line skaters, walkers, runners, strollers and wheelchair users of whom have different needs and expectations.

Background
It is commonly accepted that pavements deteriorate through damage induced by traffic and the environment. Recreational trails are not subjected to heavy truck traffic, but they are exposed to harsh environmental conditions. Moisture, oxygen and ultraviolet (UV) radiation, as well as winter freeze-thaw conditions, can all wreak havoc on the pavement causing it to become rough, brittle and crack. These distresses not only greatly reduce the aesthetic value of the trail; they are oftentimes a safety hazard and can result in expensive damage claims.

Recreational trails are often constructed with much less stringent QC/QA requirements than automotive pavements resulting in much higher in place air voids. These higher air voids makes the pavement much more permeable to oxygen and moisture thus dramatically increasing its susceptibility to environmental damage and reducing its useful service life. An effective means of reducing the susceptibility to environmental damage is to provide a weather proof seal. Many advocate placing seals on the pavements as early as possible, even after construction, to provide maximum protection from the elements. The treatment of pavements in good condition represents a
paradigm shift away from the traditional “worst first” treatment policy. This paradigm shift requires an effective preventive maintenance program, long term agency commitment and a program champion that can advocate the benefits of early treatment to political and public interests.

The research project documented the application of surface and cracks seals on both new and old pavements, all of which were in relatively good structural and functional condition.

**Surface Seals**

In 2008 a number of trail sections were treated with three basic types of sealers, including:

1. Asphalt Emulsions
2. Chip Seals
3. Asphalt Rejuvenators

A chip seal was constructed by applying the polymer modified emulsion followed by the application of fine graded high quality aggregate then covered with a CSS-1h fog seal. The chip seal not only provided a seal, but also a more durable longer lasting wearing surface.

The Gilsontie rejuvenator fog seal product claimed to rejuvenate, or restore the asphalt’s chemical and mechanical properties that had been lost to the process of environmental degradation. The liquid roads proprietary slurry seal, was similar to a chip seal, it provided a seal and a wearing surface.

**Crack Seals**

Two different types of crack sealant, over-bands, and sealing techniques were applied to a recreational trail. Preliminary results show that some practices appropriate for automotive pavements, are not appropriate for recreational trails, such as: some crack sealant types, the use of over-bands and the practice of routing cracks, underscoring the need for additional research.

Two types of asphalt emulsions were applied, a diluted rapid setting, polymer modified (CRS-2pd) asphalt which was retained near the pavement surface, and a diluted slow setting, hard based (CSS-1h) asphalt that penetrated into the pavement. Both emulsions reduced pavement permeability; however the CRS-2p changed the surface texture more, and retained the darker appearance longer than the CSS-1h.
Conclusions and Recommendations

PM treatments provided a weather proof seal over the pavement surface in order to reduce its’ susceptibility to environmental damage. Reduction of environmental damage has the potential to increase the useful service life of the pavement, thus allowing the agency to realize a cost savings. Some engineers recommend early treatment application, and some agencies have reported good performance and extended pavement life after using construction funds to seal newly constructed recreational trail pavements.

Many of the PM treatments traditionally applied to automotive pavements were applied to recreational trail pavements with little, or no, equipment modifications. This facilitated contracts that included both pavement types which reduced overall costs.

The application of the various PM treatments underscored the importance of proper project planning, especially as it relates to the end user. The end users were sensitive to the timing of the treatments, trail aesthetics and access restrictions. PM activities should occur during the week, if possible to limit the number of users affected and in late summer when the trail has maximum structural strength to limit equipment load induced damage. PM treatments should be applied with great attention to detail, as non-uniformity and tracking are readily noticed. Access restrictions were difficult to enforce as there were rarely adjacent alternative routes that offered a comparable level of service.

There is a need for wider application of pavement management systems to the trail networks, to ensure that treatments can be programmed at early enough times, on a regular cycle and coordinated in a cost effective manner. A preventive maintenance program also needs long term agency commitment and the support of a champion to fully realize the economic benefits.

For More Information:
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