RMRC

Recycled Materials Resource Center

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Research Project 70

In Situ Stabilization of Gravel Roads with Fly Ash

Project Objectives

- Development of a new large-volume application for self-cementing coal combustion products
- Assessing the engineering properties of road surface gravel, recycled pavement material, and a natural aggregate

Project Summary

There is growing interest in reducing construction costs and increasing sustainability when reconstructing paved roads and upgrading unpaved roads to paved roads. One approach is to use recycled materials in place of conventional materials. For example, road surface gravel (RSG) from a gravel road undergoing rehabilitation may be reused as the base layer for newly paved roads. Alternatively, recycled pavement material (a mixture of pulverized asphalt, base, and subgrade from the existing road) may be used as base course for the new pavement. In some cases, the strength and stiffness of these recycled materials are enhanced by blending them with cementitious material, such as fly ash from coal-fired electric power plants.

An alternative to common methods of pavement rehabilitation/reconstruction is to recycle the existing pavement materials. In situ recycling is a pavement rehabilitation method in which some, if not all, of the materials from the existing pavement are used for constructing a new pavement structure. In situ recycling is attractive because of the potential reduction in costs and consumption of natural resources.

For example, the Nevada Department of Transportation has reported a savings of $600 million over a span of 20 years by employing in situ recycling methods in lieu of common reconstruction methods. Additional benefits of in situ recycling include conservation of energy, waste reduction, and reduction of greenhouse gas emissions. There are three different types of in situ recycling in pavement rehabilitation: hot in-place recycling (HIR), cold in-place recycling (CIR), and full-depth reclamation (FDR). The three in situ recycling methods are typically classified according to the procedures used for recycling, and the materials to be recycled into the new pavement.

An impediment to more common use of recycled materials in roadway reconstruction is lack of information on their engineering properties. In addition, pavement engineers need to know how to design pavements using recycled materials that will yield equal or better performance than pavements constructed with virgin materials. This study was conducted to describe the engineering properties of a typical recycled pavement material (RPM) and recycled road surface gravel (RSG) blended with fly ash.

Project Partners

Combustion Byproducts Recycling Consortium, LaFarge North America, Great River Energy, Minnesota Local Roads Research Board

End Products

RPM had a higher summary resilient modulus (SRM) than Class 5 base (control), whereas the SRM for RSG was slightly lower than that of Class 5 base. RPM also exhibited smaller plastic strains during M_r testing than Class 5 base, whereas RSG showed similar plastic strains to Class 5 base.

Further Information

The Recycled Materials Resource Center (RMRC) is a national center that promotes the appropriate use of recycled materials in the highway environment. It focuses on the long-term performance and environmental implications of using recycled materials