RMRC

Recycled Materials Resource Center

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Research Project 47

Stabilization of Reclaimed Pavement Material and Road Surface Gravel

Project Objectives

- Development of a practical method to design local roadways using a SRPM or SRSG base layer
- Evaluate the use of Class C fly ash as the stabilizing agent in design methodology employed for local roads in Minnesota

Project Summary

Recycling part or all of the pavement materials in an existing road during rehabilitation and reconstruction is an attractive construction alternative. For roads with a hot mix asphalt (HMA) surface, the HMA, underlying base, and a portion of the existing subgrade often are pulverized to form a new base material referred to as recycled pavement material (RPM). Compacted RPM is overlain with a new HMA layer to create a reconstructed or rehabilitated pavement. This process is often referred to as full-depth reclamation (FDR). Similarly, when an unpaved road with a gravel surface is upgraded to a paved road, the existing road surface gravel (RSG) is blended and compacted to form a new base layer that is overlain with an HMA surface. Recycling pavement and road materials in this manner is both cost effective and environmentally friendly.

Recycled base materials may contain asphalt binder, fines, and/or other deleterious materials that can adversely affect strength and stiffness. To address this issue, chemical stabilizing agents such as cement, asphalt emulsions, lime, cement kiln dust (CKD), or cementitious fly ash can be blended with RPM or RSG to increase the strength and stiffness. This "stabilized' material is referred to a SRPM or SRSG. Use of industrial material resources for stabilization, such as CKD or fly ash, is particularly attractive in the context of sustainability.

The purpose of this study was to develop a practical method to design local roadways using SRPM or SRSG as the base layer and Class C fly ash as the stabilizing agent in the context of the "gravel equivalency" (GE) design methodology employed for local roads in Minnesota. The project consisted of four major elements: laboratory testing, prototype pavement evaluation, field assessment of two existing roadways constructed with SRPM and SRSG, and assessment of potential impacts to ground water. This summary report was created as a design guide and includes step-by step design procedures along with practical implications relevant to implementation.

Project Partners

Minnesota Local Roads Research Board, Great River Energy Inc., Lafarge Inc.,
U.S. Department of Energy Combustion Byproducts Recycling Consortium

End Results

Results of these simulations were used to identify conditions that result in lower peak concentrations at the edge of a right of way. The following conditions were identified:

- Lower peak concentrations are expected at sites with greater depth to ground water
- Presence of a less permeable layer within the pavement profile (e.g., HMA with low air voids content, fine-grained subgrade, etc.) will reduce peak concentrations in ground water, 10
- Use of a thinner layer of SRPM, when practical, will result in lower peak concentrations
- Application to narrower roadways, such as city streets and secondary highways, has less impact on ground water than applications on wide highway pavements.

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