RMRC

Recycled Materials Resource Center

THE UNIVERSITY of WISCONSIN MADISON

Research Project 76

Reuse of Asphalt Shingles in Roadway Construction

Project Objectives

- Development of guidelines for the addition recycled asphalt shingles into hot mix asphalt
- Determination the effect of fly ash stabilization on the strength of recycled asphalt shingles

Project Summary

Approximately 11 million tons of reclaimed asphalt shingles (RAS) are disposed in landfills every year. Research has demonstrated that these materials can be recycled into a variety of products. A widespread, large-scale recycling and reuse application would utilize an otherwise wasted resource while clearing landfill space and creating new business opportunities.

One potential reuse application is the utilization of RAS in the aggregate base (AB) and subbase (ASB) layers of roadway pavements and as working platforms for pavement construction over soft subgrades, and as embankment fills. RAS has the potential to act as an additive or substitute for the earth materials typically utilized in these applications. Like any recycling activity, the proper regulatory and permitting requirements for the reuse of RAS must be addressed.

The purpose of this study was to determine the technical specifications of RAS, the effect of fly ash stabilization on RAS strength, and the practicality of the widespread implementation of RAS in roadway applications. RAS, fly ash stabilized RAS (S-RAS), RAS-aggregate mixtures, and RASsilt mixtures were evaluated for particle size characteristics, compaction characteristics, California Bearing Ratio (CBR), unconfined compressive strength, and resilient modulus.

In summary, RAS is a granular material with particle size characteristics similar to that of well-graded sand, however, with very different particle shape and strength. RAS stiffness, in general, increases with increasing dry unit weight, and RAS dry unit weight increases with decreasing maximum particle size and increasing fines percentage; although the nature of RAS particles also play a role. The localized penetrative resistance, or CBR, of RAS is small.

Project Partners

Minnesota Local Road Research Board, Minnesota Department of Transportation

End Results

According to resilient modulus test results, pure, chemically unstabilized RAS is unsuitable as base material although unstabilized RAS can be used as subbase or general fill material. Additionally, RAS-Grade 2 granular backfill mixtures (minimum 50:50 mass-to-mass ratio) are suitable for use as subbase and are potentially suitable for use as base course in an unstabilized state.

Fly ash stabilized (class C fly ash at 20% by dry mass of RAS) RAS (S-RAS) is less susceptible to penetrative deformation than unstabilized RAS, however; S-RAS is still highly susceptible to penetrative deformation when unpaved. S-RAS experienced measurable improvement in resilient modulus over unstabilized specimens; however, the improvement does not render S-RAS as a base course material.

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.

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