RMRC

Recycled Materials Resource Center

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Research Project 59

Evaluation of Recycled Asphalt Shingles as Structural Fill

Project Objectives

- Provide a comprehensive overview of the engineering and construction materials properties in green infrastructure construction.
- The materials are foundry sand, fly ash, bottom ash boiler slag, and flue gas desulfurization material

Project Summary

This project focused upon gathering four reports on the properties of four green infrastructure materials, allowing knowledge to accessible in one location. Each report focuses on studies addressing environmental concerns of using green materials, where both industrial by-products and construction materials are reviewed.

Foundry sand is a material with a large quantity across the U.S. The metal casting industry annually uses an estimated 100 million tons of foundry sand for production. Consequently, 9 to 10 million tons of sand is discarded each year. However, the discarded foundry sands are typically considered a higher quality material than typical bank run or natural sands used in construction. Currently, an estimated 28% of discarded sand is reused in primarily construction related applications, while the remaining sand is disposed of in landfills. Reuse of foundry sand could lead to less landfill material and reduce cost.

Boiler slag is a recycled material used prevalently. Nearly 84 percent of all boiler slag generated annually in the U.S. is utilized. Most of the boiler slag is used as blasting grit and roofing shingle granules. Boiler slag is also used in transportation applications, including structural fills, mineral filler, and snow and ice control. It has been used as aggregate in asphalt paving and as a road base and subbase. Its flexibility can allow it to be a widely used material.

FGD scrubber systems at coal-fired power plants generated approximately 30.2 million tons of FGD. Approximately 30 percent of the FGD material produced in 2006 was beneficially used. Fixated or stabilized calcium sulfite FGD scrubber material has been used as an embankment and road base material. FGD products have also been used in place of gypsum, as feed material to produce Portland cement. In addition, FGD material has been used in flowable fill in mine reclamation and in aerated concrete blocks.

In 2006 the ACAA reported that 72.4 million tons of coal fly ash were produced. Approximately 32.4 million tons of fly ash was used predominantly in the production of concrete, concrete products, and grout. Fly ash is useful in many applications because it is a pozzolan, meaning it will combine with calcium hydroxide to form cementitious compounds. This makes it useful as an alternative in the construction industry.

Project Partners

Federal Highway Administration, United States Environmental Protection Agency

End Products

This paper provides a comprehensive overview of the engineering and construction properties of green materials for use in areas including but not limited to Portland cement and concrete, hot mix asphalt, road subbase layers, embankments, and flowable fill. Recent studies addressing environmental concerns of using green materials, industrial by-products, as a construction material are reviewed.

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