TECHSUMMARY December 2011

State Project No. 736-99-1586 / LTRC Project No. 09-2C

Evaluation of Cement and Fly Ash Treated Recycled Asphalt Pavement and Aggregates for Base Construction

INTRODUCTION

Many entities currently use recycled asphalt pavement (RAP) and other aggregates as base materials, temporary haul roads, and, in the case of RAP, hot mix asphalt construction. Several states currently allow the use of RAP combined with cement for a stabilized base course under both asphalt and concrete pavements. Currently, there is disagreement on what properties are required and how to test the cement and fly ash treated RAP for both asphalt and concrete pavement structures.

This project investigated cement and fly ash treated RAP and other materials to determine their suitability for base course construction.

OBJECTIVE

The objective of this research was to determine feasibility of cement and fly ash treated RAP and other aggregates as a structural layer for both portland cement concrete and hot mix asphalt pavement systems.

SCOPE

To complete the objective, two sources of RAP were investigated, limestone based and gravel based. A 610 crushed limestone was used as a reference material. Other aggregates included in the test matrix were Mexican 610 limestone and blended calcium sulfate. The materials were mixed with portland cement and class C fly ash at three levels and tested for strength and shrinkage. Upon determining the optimum level, three percentages (5, 10, and 15 percent) of sand and soil cement were subsequently added to determine their respective effects of strength and shrinkage. Statistical analysis was completed on the results to determine the optimal combinations and then the mixtures were duplicated and compacted to better simulate field compaction and construction techniques.

LTRC Report 481

Read online summary or final report:
www.ltrc.lsu.edu/publications.html

PRINCIPAL INVESTIGATOR:
Tyson Rupnow, Ph.D., P.E.

LTRC CONTACT:
Chris Abadie, P.E.
225. 767.9109

Louisiana Transportation Research Center

4101 Gourrier Ave
Baton Rouge, LA 70808-4443

www.ltrc.lsu.edu

METHODOLOGY

The cementitious materials for the laboratory portion of this study included type I/II portland cement and class C fly ash locally available in the state of Louisiana.

Each of the cementitious material was chemically characterized according to its respective American Society for Testing and Materials (ASTM) standard. Test specimens were tested for compressive strength at 7 and 28 days of age. Specimens were also tested for flexural strength at 28 days of age. Length change and resilient modulus were also measured.

CONCLUSIONS

Mixtures achieving 150 and 300 psi were capable of being produced with 4 to 8 percent portland cement and 10 to 20 percent class C fly ash. The compacted specimens achieved equal to or up to 2.5 times greater compressive strength than those samples that were uncompacted.

The reference and Mexican 610 limestone produced much higher strengths compared to the RAP and BCS mixtures. The BCS mixtures proved adequate in terms of shrinkage, strength, and did not fall apart when stored in the 100 percent humidity room or underwater for the requisite 14-day cure period for the length change test.

The resilient modulus results were similar across all samples, but no discernable trend could be determined, most likely due to the test containing only one sample for analysis.

The results show that cement and fly ash treated RAP and other materials can be used in base course construction.

RECOMMENDATIONS

It is recommended that the Department construct several full-scale test sections incorporating stabilized RAP and BCS into base course construction. One such location has already been determined to be a good pilot project and is located on LA 975 north of Interstate 10.