

Development and Demonstration of High-carbon CCPs AND FGD By-products in Permeable Roadway Base Construction

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Report No. CBU-2001-12

ABSTRACT

This investigation was conducted to develop and demonstrate permeable base course materials using coal combustion products (CCPs) for highways, roadways, and airfield pavements. Three types of CCPs, two flue-gas desulfurization (FGD) by-products, and a variable-carbon fly ash, are being evaluated for no-fines or low-fines concrete as a permeable base material. This report includes the work completed during the period from April 1, 2001 through June 30, 2001 as well as reports all of the work completed during the first year of the project. During this period, various parts of the work pertaining to Tasks 2, 3, and 4 of the project were completed. Additional work related to Tasks 2 and 3 is in progress.

Mixture proportions for the base course materials are being finalized using a two-step experimental optimization process. The first step involved developing mixture proportions for permeable base course materials containing no CCPs. The optimum mixtures developed from the first step of the experimental process were used as candidate mixture proportions for the second step of the optimization process. The second step of the mixtures includes various combinations of the three CCPs for developing mixtures for base course materials. To date a total of 50 mixtures have been proportioned and manufactured (20 mixtures were completed during this past quarter). Specimens from each mixture were made using roller-compacted concrete (RCC) technology in accordance with ASTM C 1435. Experimental investigation pertaining to the first step of the optimization process has been completed. Mixture proportioning, manufacturing, and testing are in progress for the second step of optimization. Three different series of base course mixtures were developed and tested during the past quarter based on the structure of the base course: dense-graded, intermediate-graded, and open-grade. Manufacturing of dense-graded and open-graded base course materials were completed for all three sources of ash. Mixtures for the intermediate-graded base course materials were completed for one of the ash sources. Work related to the long-term testing of mixtures for dense- and open-graded structures will continue over the next quarter as well as completion of the intermediate-graded base course mixtures. Test results obtained over the next quarter should be sufficient to complete the second step of optimization mixtures, as well as the development of utilization criteria of the ash materials in permeable base construction.