

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

By Tarun R. Naik, Shiw S. Singh, and Rudolph N. Kraus

Report No. CBU-2001-02

ABSTRACT

This investigation was undertaken 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 second quarterly report includes the work completed during the period from June 1, 2000 through December 31, 2000. During this period, the work completed is related to Tasks 1, 2, and 3 of the project. Testing of all constituent materials such as fine aggregate, coarse aggregate, cement, and CCPs required for manufacture of the base course materials has been completed. These materials were tested and evaluated for physical and chemical properties per ASTM requirements. Based on the measured properties of the constituent materials and collected literature data, mixture proportions for the permeable base course materials are being developed. During this quarter, two series of mixtures without CCPs were initially proportioned. Series 1 mixtures were composed of six mixtures with varying amounts of coarse and fine aggregates. These mixtures were produced and tested using conventional concrete technology. Based on the results of Series 1 mixtures, additional seven Series 2 concrete mixtures without CCPs were proportioned and tested. Specimens from these mixtures were made using roller-compacted concrete (RCC) technology in accordance with ASTM C 1435. The RCC technology was selected as it simulates the actual construction compaction for permeable roadway base course. Most of the testing of these RCC specimens has been completed. Based on the results of the Series 2 mixtures, additional RCC mixtures for base course will be developed using various combinations of the three CCPs for actual construction applications. Testing and evaluation of these mixtures will be continued during the next quarter.