

**DEVELOPMENT AND DEMONSTRATION OF POROUS BASE COURSE  
MATERIALS FOR PAVEMENTS USING ILLINOIS COAL COMBUSTION  
PRODUCTS**

By Tarun R. Naik and Rudolph N. Kraus

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**ABSTRACT**

This project was developed as a technology transfer program to develop a porous, low-strength concrete that uses large amounts of non-specification ash generated from the combustion of coal from Illinois. The Illinois-coal combustion products used for this project had a very high carbon content, over 30%. Typically, high carbon ash have little use in construction materials; however, previous project work conducted by the UWM Center for By-Products Utilization showed the feasibility of using this type of ash in porous base construction. A properly designed and constructed porous base eliminates pumping, faulting, and cracking in pavement, thus increasing the service life of roadways, highways, and air field pavements.

Porous concrete mixtures were first manufactured and tested in the UWM-CBU laboratory. These laboratory mixtures varied the amount of ash from 0% to approximately 50%. These mixtures were evaluated for fresh porous concrete properties as well as compressive strength, splitting tensile strength, flexural strength, drying shrinkage, sulfate resistance, and resistance to freezing and thawing. Hardened concrete properties were evaluated up to the age of 91 days. The laboratory mixtures were then used as the basis for mixture proportions used for field manufacturing. Pilot-scale field mixtures were manufactured at the facilities of the United Ready-Mix, Inc., Peoria, IL. The porous concrete field mixtures generated the necessary experimental and production data to determine acceptable levels of coal ash in porous base concrete mixtures for commercial production. To disseminate the results of this project to others in Illinois, a construction demonstration/technology transfer workshop was held in Peoria with cooperation from the United Ready-Mix, Inc. and the City of Peoria, Department of Public Works. The workshop consisted of a half day of lectures presenting technical results obtained for this project as well as a construction demonstration on the placement of porous base course concrete for a section of street in Peoria. The porous concrete mixture used for the demonstration used the highest amount of Illinois-coal ash tested for the project, over 50% by weight of total cementitious materials. Results of the project indicate that high-carbon Illinois-coal ash may successfully be used in porous base course applications.