



KANSAS

DEPARTMENT OF TRANSPORTATION

DURABILITY OF CLASSED LIMESTONE COARSE AGGREGATE STUDY, US-169, JOHNSON COUNTY, KANSAS

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By: Rodney A. Montney, P.E., Robert F. Heinen, John Wojakowski, P.E.
Kansas Department of Transportation

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Introduction

The Kansas Department of Transportation began evaluating individual beds in limestone quarries for suitability for use in concrete pavement in 1980. Aggregates that were suitable for use in Portland Cement Concrete Pavement (PCCP) were designated as Durability Class I Aggregate. By 1986 several quarries had been evaluated and it was decided to construct a project with various Durability Classed Aggregates to prove the system that was used to classify the limestones. Class I Limestone has a 95% probability of providing 20 years of service life before the pavement is rehabilitated due to D-cracking.

Project Description

The project consisted of the evaluation of four sections of pavement on US-169, 5 miles south of Olathe in Johnson County, Kansas. The pavement was constructed using 9-inch plain PCCP with 15-foot skewed joints. No dowel bars were used for load transfer. The testing on the aggregate delivered to the project indicated the quality of the aggregates used for test sections three and four was better than specified.

Project Results

The results of the testing indicated that test sections 1 and 2 were constructed with Class 1 Aggregate and test sections 3 and 4 were not. Aggregates with the durability factors specified for sections 3 and 4 would be expected to show severe D-cracking within the first 10 years of pavement life. Aggregates that were supplied for sections 3 and 4 should last considerably longer than the anticipated 10 year life. However, the durability factors were still lower than the other two test sections, so the decision was made to continue monitoring the project. Sections 3 and 4 were still expected to show signs of D-cracking before sections 1 and 2.

The pavement in section 4 was deteriorated and replaced within 14 years of construction. The limestone in section 4 had a durability factor of 91 which was the lowest of the 4 sections. The D-cracked joints in section 3 were replaced within 13 years of construction. The pavement patching was also due to excessive spalling of the joints. Six years after the rehabilitation, the joints in section 3 again began to show signs of distress. Sections 1 and 2 showed no signs of distress 6 years after a dowel bar retrofit.

Report Information

For technical information on this report, please contact: Rodney Montney, Kansas Department of Transportation, Address; 2300 SW Van Buren, Topeka, Kansas, 66611; Phone: 785-291-3844; fax: 785-296-2526; e-mail: Rodney.Montney@ksdot.org.

For a copy of the full report, please contact: KDOT Library; 700 SW Harrison Street, Topeka, Kansas 66603-3754; Phone: 785-291-3854; Fax: 785-291-3717; e-mail: library@ksdot.org.