OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF PAVEMENT ENGINEERING
RESEARCH IMPLEMENTATION PLAN

Title: Long Term Monitoring of Broken & Seated Pavements

State Job Number: 14670
PID Number:
Research Agency: University of Cincinnati
Researcher(s): Arudi Rajagopal, Issam Minkarah
Technical Liaison(s): Aric Morse, Roger Green, Keith Keeran, Randall Morris
Research Manager: Karen Pannell
Sponsor(s): Howard Wood, David Humphrey
Study Start Date: 1/15/1997
Study Completion Date: 10/30/2002
Study Duration: 70 Months
Study Cost: $145,424.00
Study Funding Type: 80 Federal / 20 State, ODOT SPR (2)

STATEMENT OF NEED:

In 1984, ODOT began using the break and seat technique as one of the rehabilitation methods for jointed reinforced concrete pavement (JRCP). Approximately 200 centerline miles of pavement have been rehabilitated using the break and seat technique. During a review of Ohio's pavement rehabilitation program by the Ohio Division of the FHWA in 1992, it was noted that performance studies of break and seat projects were not conclusive. As a result, the report recommended ODOT restrict the use of the break and seat method to non reinforced concrete pavement. ODOT imposed a moratorium on the use of the break & seat technique and initiated a research project in association with the University of Cincinnati to validate the FHWA findings. The goal of the project was to systematically evaluate the effectiveness of breaking and seating JRCP. Two test projects, each containing control sections, were constructed and monitored for a 2 ½ year period. The conclusion of this study was the break and seat technique did alter the structural characteristics of the test pavements and also was effective in delaying and minimizing reflective cracking. However, these conclusions were based on short term performance of the test sections. Research was needed to investigate the long term performance (10 years) of the break and seat rehabilitation technique.

RESEARCH OBJECTIVES:

The objective was to monitor the asphalt overlays on the control and broken and seated test sections in Ohio to obtain relevant information on the long term performance of broken and seated joint reinforced concrete pavement.

RESEARCH TASKS:

1. Continue to monitor the initiation, development and progression of cracking.
2. ODOT will continue to collect deflection data and the researcher will continue to analyze the data.
3. Using the data, establish long term effectiveness of breaking and seating by comparing the performance of the broken and seated sections to the control sections.
4. Establish a database for continued studies of the performance of broken and seated pavements.
5. Conduct a statistical analysis on the data.

RESEARCH DELIVERABLES:

1. Final report.
2. Database.

RESEARCH RECOMMENDATIONS (based on long term performance monitoring):

1. The break and seat technique can be used effectively to delay and minimize the development of reflective cracking in jointed reinforced concrete pavement.

2. A pile hammer should be used to break the pavement; the guillotine hammer is not capable of producing the desired results.

3. Research is needed to develop an appropriate layer coefficient value for the broken and seated layers; this coefficient is an important input in the design and rehabilitation of broken and seated pavements.

4. ODOT should develop appropriate quality control measures to check the extent of breaking achieved.

PROJECT PANEL COMMENTS:
The final report was published May, 2002. There was a significant increase in the amount of reflective cracking in the break & seat sections noted during a follow up visit to the SR-4 project by the PI and ODOT in February of 2004. As a result of this study, a research project was initiated to study the cause of the distress.

IMPLEMENTATION STEPS & TIME FRAME:
A research project, State Job Number: 134196, entitled "Investigation of Pavement Cracking on SR-4 and Demonstration of Multi-head Breaker in Fracturing Reinforced PCC Pavement before AC Overlay" was initiated August 15, 2004. This project was completed March, 2006.

Upon completion of the State Job Number: 134196, the Office of Pavement Engineering will develop a white paper summarizing research conducted in Ohio and elsewhere with recommendations on the future use of the break & seat technique. The white paper will be completed by December, 2006.

EXPECTED BENEFITS:
This research project, including the follow up study, will provide ODOT the information needed to make a decision on whether to continue the moratorium on break & seat or not.

EXPECTED RISKS, OBSTACLES, & STRATEGIES TO OVERCOME THEM:
None

OTHER ODOT OFFICES AFFECTED BY THE CHANGE:
Districts

PROGRESS REPORTING & TIME FRAME:

The final report for the research project "Investigation of Pavement Cracking on SR-4 and Demonstration of Multi-head Breaker in Fracturing Reinforced PCC Pavement before AC Overlay" was completed March, 2006.

The OPE white paper on break and seat is scheduled for completion by December, 2006.

After the completion of the white paper, there will be quarterly reports until successful implementation of the results.

TECHNOLOGY TRANSFER METHODS TO BE USED:
The Final Report of the research has been distributed to 49 state transportation departments, different FHWA offices, selected national libraries, and others.

IMPLEMENTATION COST & SOURCE OF FUNDING:
The cost State Job Number: 134196 is $63,258.33 coming form research funds of the Department. The other implementation costs are incidental and minor.

Approved By: (attached additional sheets if necessary)

Office Administrator(s):

Signature: David Humphrey Office: OPE Date: 12/07/2006

Division Deputy Director(s):

Signature: Howard Wood Division: Planning Date: 12/07/2006