Project Number: 0-4687
Title: Rubblization and Crack and Seat as Major Rehabilitation for Concrete Pavements
RMC Number: 1 Strategic Issues 2 & 5: Pavement Construction & Design
Developed By: RMC 1 TAP Revised by Dr Claros RTI
Project Statement Date: December 16, 2003

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Duration (# of years): 3 Total Budget: $ Budget by year:
First Year FY $ Second Year FY $ Additional FYs $

Project Description: Rehabilitation of Portland Cement Concrete Pavements (PCCP) is a major issue for TxDOT. Black topping or white topping are two available choices; but either of these will often exhibit reflection of the cracks/joints from the underlying concrete pavement into the new topping, reveal failures in the underlying concrete that were not properly repaired, and/or exhibit delamination between the old and new pavement layers. Proper and complete preparation of concrete pavements prior to receiving an overlay often requires long periods of traffic disruption and significant funds. One method that has eliminated the time-consuming PCCP repair step and provided excellent performance is pulverizing the PCCP followed by a thick Hot Mix Asphalt (HMA) overlay. Overlaying may include: a level-up course, a thick dense-graded large-stone mix, and a thin surface course of SMA or Permeable Friction Course (PFC).

Pulverization of the PCCP may be accomplished by either of two basic methods: (1) rubblization, or (2) cracking & seating. There are several different specific processes for in-place crushing of the PCCP. Under given conditions, one process may offer advantages over the other. Generally, either of these processes can easily break up about one lane-mile per day of concrete pavement. Subsurface drainage has demonstrated significant advantages when building a pavement structure over a pulverized PCCP.

Because of a lack of knowledge of the existing pavement structure, some agencies have had poor experiences during the rehabilitation process. Guidelines need to be developed to support standardized site investigation procedures to determine whether the PCCP is a candidate for pulverization plus HMA overlay, determine which pulverization process is best, develop a pavement design before pulverization to permit a bid of the complete project. With proper site investigation, design, and construction, such a project might be considered a perpetual pavement (i.e., a long-term pavement structure where only the surface is rehabilitated periodically).

Because of the lack of information and understanding of these valuable rehabilitation tools, they are not being used to their fullest potential in Texas. Research is needed to:
1. Review and summarize all the available information on the use of Rubblization and Crack and Seat as rehabilitation options for concrete pavements. This should include national and international publications.
2. Develop a standard plan for forensic investigations to ensure a given concrete pavement is a proper candidate for pulverization plus thick overlay. This will likely involve Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR), which will identify where coring & testing is necessary.
3. Develop a step-wise process for determining whether cracking/seating (C/S) or rubblization (RB) is the best choice for the project.
4. Develop non-invasive method to verify that broken concrete size specifications have been met.
5. Develop a pavement type selection process to determine the most suitable topping, considering structure, traffic,
and climate, etc. This could use the TxPTS program developed on project 0-1734.

6. Develop a pavement thickness design procedure for the type of pavement selected. The procedure should enable the Engineer to determine the most efficient pavement thickness before the existing concrete pavement is pulverized so that a complete project bid can be obtained.

7. Identify any special requirements for pavement systems placed over pulverized PCCP layers: mixture designs, structural designs, drainage accommodations, etc., and;

8. Prepare design and construction guidelines for rehabilitation of PCCP pavements by pulverizing and overlaying with thick asphalt layers.

9. Apply the develop system to one or two actual highway rehabilitation projects to provide field proof of the procedures developed and the economic efficiency of using these rehabilitation techniques. This should include support to the districts in testing, designing and technical support during construction.

10. Conduct several training courses on the application of the rehabilitation system for the districts in which this system can be applied.

Deliverable Products and Reports:

Deliverable products and reports from this research should include:

1. A standard plan for forensic investigations to ensure a given concrete pavement is a proper candidate.
2. A step-wise process for determining whether C/S or RB is the best choice.
3. A non-invasive method to verify broken concrete size specifications have been met.
4. A pavement type selection process to determine the most suitable topping, considering structure, traffic, and climate.
5. A pavement thickness design procedure for the type of pavement selected.
7. Reports that fully document the research performed, findings and recommendations.
8. Project Summary Report (PSR) of a maximum of 4 pages to summarize work accomplished, findings and conclusions.

Implementation:

Conduct half-day courses in appropriate regions of Texas to instruct engineers/inspectors regarding new guidelines for site investigation, pavement type selection, rehabilitation design, construction, construction inspection, and evaluation/acceptance of these rehabilitated pavements. Implementation may include revision of pertinent current specifications or development of new specifications. In addition, revisions to current pavement design software may be involved in the complete implementation of the project findings.

Pre-Proposal Meeting:  

☐ Yes  ☐ No  

Tuesday, February 10, 2004, 10:00 a.m. to 11:00 a.m. at 4000 Jackson Avenue, Bldg. 1, Austin, TX in the San Jacinto Conference Room, 3rd floor. Teleconferencing is available.

Sole-Source Project:  

☐ Yes  ☒ No  

Proposal Submission:

- Proposals are required to be submitted in both hard copy (4 copies) and PDF format (1 PDF file per proposal). Both formats are used within TxDOT for evaluating the proposals and must contain identical information.
- The “Background and Significance” portion of the proposal should be limited to 10 pages.
- All proposals from researchers should be sent directly to your university’s Research Liaison for submission to RTI. The Research Liaison is TxDOT’s official contact with the university.

Deadlines (for RTI use only):

1. All individuals interested in proposing are encouraged to contact the PC/PD by February 6, 2004.
2. Proposals are due to RTI by 4:00 p.m. CST on Wednesday, March 24, 2004.