Research Project Statement

Fiscal Year: 2005
Project Statement Date: December 5, 2003

Project Number: 0-4872
Title: Material Design and Testing Methods for Home Made and Containerized Cold Mix.

RMC Number: 1
Developed By: Stevan Perez, P.E. & Tracy Cumby

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Duration (# of years): 2

Total Budget: $
First Year FY $ 
Second Year FY $ 
Additional FYs FY $

Project Description: There are many Maintenance sections (especially in remote rural areas) that make their own patching mix. Home made mixes can be produced at a fraction of the cost of plant mixes, can be produced on demand, and allow Maintenance Sections to keep fresh stockpiles. Home made mixes perform well in moderate to good weather conditions but experience a high failure rate during cold and wet weather. During cold and wet weather patches placed with home made mix fail and crews return several times to repair the same location until the weather changes enough to perform additional corrective measures. An affordable admixture that would work with the asphalt and emulsion binders commonly used in maintenance operations such as RC-250 or CRS-2P is needed for use during cold and wet weather. This admixture would also allow for stockpile storage and cold weather workability. Additives that are currently available and allow proper bonding under these conditions are expensive and little information is available about using these products in home made mix. High performance mixes such as “Containerized Patch Mix DSM 9203” have proven to perform successfully in cold and wet weather, but are not practical for use in large areas that often occur during winter conditions.

Containerized mixes are excellent for cold/wet weather repairs on a small scale (less than 1 square yard), but the cost limits the use to high priority roadways. Containerized Mixes need to be available as a tool for maintenance forces to use on all roadways at an affordable cost. Less expensive containerized mixes are available and have also proven effective in cold and wet weather in limited field tests sponsored by material suppliers. These alternative mixes have however, failed to meet TX-DOT specifications that define the container type. TX-DOT specification DSM-9203 should be evaluated to determine if alternative container types are available that adequately contain and store the material. If other containers of adequate quality are available, this would increase competition and significantly lower the cost of containerized mix. Modification to DSM 9203 would be based on successful lab and field trials using a wide cross section of containerized mixes, including evaluation of the containers ability to protect the patch mix. The revised specification should contain standards of performance as well as requirements for material components and acceptable container types.

The proposed research shall investigate appropriate admixtures for home made mix, identify performance criteria for home made and containerized patch mixes, monitor field test sections to determine performance capabilities and investigate various container types that will meet department standards for containerized patch mix. To accomplish

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these objectives, the research is expected to include the following tasks as a minimum:

- Determine testing methods (TX-DOT Testing Procedures) to predict performance in variable weather and traffic conditions for home made and containerized mixes.
- Develop design procedure and specifications for home made mixes to be placed in cold and wet weather. Mixes are to be designed for use on roadways with low, moderate and high volume traffic and have a duration of six months.
- Mix designs should include only those materials (i.e. sand, rock, etc.) that are readily available to the maintenance sections preparing the mixes.
- Conduct Lab testing using TX-DOT or Federal Highway Administration (FHWA) testing methods on Home Made and Containerized Mixes to determine workability and long term durability.
- Conduct Lab tests to determine the durability of various containers currently being used to contain high performance mixes. Determine a factor of safety and a cost/benefit analysis for each container represented in the testing. Lab testing and field testing will be the basis for final recommendation for allowable container types.
- Conduct a 6-8 month field evaluation of home made mixes in cold/wet conditions. Field Tests would be conducted in the Northwest and Southeast regions of Texas. Test sections would be placed by TX-DOT Maintenance forces using materials supplied by the research team. TX-DOT forces would blend home made mixes using normal procedures and provide traffic control.
- Monitor field performance of various mix containers (provided by researchers). Monitor handling procedures and container performance to verify lab results. Patching would be conducted by TX-DOT forces with research team present during loading, unloading and actual placement from containers. Mix performance would also be monitored for a 6-8 month period.

Recommend revision to DSM 9203 if appropriate.

Deliverable Products And Reports:

- **First Year Report**: To include the ability of home made mixes (using new designs) to meet the same performance standards as containerized mix based on lab results. Recommend types of containers that adequately protect high performance patch mix during handling and storage.
- **Product 1**: Develop a Modified Specification for High Performance Cold Mix in containers that includes performance criteria.
- **Product 2**: Prepare a manual for use by field and lab personnel that outlines the mix design procedures and specifications for home made mix under variable traffic and weather conditions. The manual should include pertinent information derived from field evaluations.
- **Final Report**: To include results of lab and field testing. Also to include results of container performance tests. Recommendations of mix design and specifications with a variety of admixtures to be used in home made mix. The final report should fully document the research performed, findings and recommendations
- **Project Summary Report** concisely outlining the research outlining the research, findings and recommendations for implementation.

Implementation:

The products of this research have potential for state wide implementation. Disseminate recommendations in reports and field manuals to maintenance personnel for immediate use.

Pre-proposal Meeting:  
☑ Yes  ☐ No  
Thursday, February 19, 2004, 1:00 p.m. to 2:00 p.m. at 4000 Jackson Avenue, Bldg. 1, Austin, TX in the San Jacinto Conference Room, 3rd floor. Teleconferencing is available.

Sole Source Justification, if applicable: N/A

Additional Information: None

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 12, 2004.
2. Proposals are due to RTI by 4:00 p.m. CST on Wednesday, March 24, 2004.