HPP PROJECT DESCRIPTION

PROJECT NUMBER:
01231

PROJECT TITLE:
Improved Management of RCC Pavement Technology

PRINCIPAL INVESTIGATOR:
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PROJECT OBJECTIVES:
a) To develop an innovative design procedure to improve economy and performance of RCC, using the Strategic Highway Research Program (SHRP) gyratory compactor and volumetric mix design procedures developed for asphalt pavements (e.g., Superpave).
b) To validate this procedure through comparison of laboratory and field test results.

PROJECT ABSTRACT:
Roller compacted concrete (RCC) has been shown to be an economical, durable, low-maintenance material for construction of pavements and other civil infrastructure (such as dams). Use of RCC in the U.S. and Canada has shown the potential for long life and low maintenance costs. However, a significant obstacle to the expanded use of this technology remains. At the present time, there is no simple, reliable method for preparing laboratory specimens to predict field performance. Many of the current methods of preparing laboratory specimens to date are difficult, require proprietary equipment, or do not correlate well with field observations. Application of gyratory compactor technology to RCC offers the potential for rapid, reliable preparation of specimens. Furthermore, it takes advantage of widely available laboratory equipment developed to support SuperPave, and already owned by state materials laboratories and most large commercial testing laboratories. The percent compaction of RCC is important for performance, and with a gyratory compactor it is possible to replicate field compaction exactly in the laboratory. By comparing laboratory results to cores obtained from the Honda construction site in Lincoln, Alabama, using identical materials and mixture proportions, it will be possible to develop a calibrated and validated procedure. In Alabama, RCC pavements are applicable to industrial facilities, highway rest areas and weigh stations, aircraft parking aprons, and multimodal facilities (including state dock renovation and expansion). This procedure will make it possible to optimize RCC proportioning to reduce costs and improve performance.

PROJECT TASK DESCRIPTIONS:
- Literature review
- Materials testing
- Field verification
• Technology transfer package
• Final report

MILESTONES AND DATES:
August 1, 2001: Project start date – literature review and materials testing
November 1, 2001: Field verification – compare field test results to laboratory results
April 1, 2002: Begin development of technology transfer package
June 1, 2002: Begin final report, complete materials testing
July 31, 2002: Project end date – submit project final report to UTCA

TOTAL BUDGET:
One-year project: other (HPP) $50,000; total budget $101,000.

STUDENT INVOLVEMENT:
One graduate research assistant will be involved with this project.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This project builds on the collaborations with ALDOT and industry developed during UTCA projects 99247-“Transfer of Transportation Materials Technology for Concrete Pavement” by Delatte and 01220-“Design and Quality Control of Concrete Overlays and Repairs” by Delatte.

TECHNOLOGY TRANSFER ACTIVITIES:
Presentations will be made at regional conferences and symposia, and a paper will be submitted for presentation at TRB’s annual meeting. This project will develop a technology transfer package for delivery to ALDOT personnel and other interested transportation professionals.

POTENTIAL BENEFITS OF THE PROJECT:
The potential benefits of this project include:
1. International recognition of UTCA in this important emerging technology.
2. A relationship between relative compaction of RCC and strength and performance may be established. This will make it possible to optimize construction procedures, and perhaps design improved RCC placement and compaction equipment.
3. The aggregate structure of RCC can be optimized, improving performance while reducing paste requirements, and thus costs. It may be possible to incorporate a significant fraction of limestone dust within RCC, thus making use of a quarry by-product.
4. The influence of maximum aggregate size on RCC performance may be determined. Larger aggregates improve economy at a cost of surface texture. Alternatively, surface texture and smoothness may be improved by using smaller maximum size aggregates or special aggregate blends.
5. This technology will make it possible to make further use of industrial byproducts such as fly ash and slag in RCC while improving performance. This will reduce costs while mitigating environmental impacts for a number of industries that are important to Alabama’s economy.
TRB KEYWORDS:
Roller compacted concrete pavements, volumetric analysis, concrete aggregates, concrete construction, concrete tests, durability, test methods, compaction.