LTRC
2008 Peer Exchange
May 13 – 15, 2008

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Louisiana Transportation Research Center

Legislative Budget Review

- What is the nature and type of work that is done by the state's universities related to (requested) expenditures?

Legislative Budget Review

- Please provide a total cost of payments made to universities over the past five years along with the specific projects or research completed.

Legislative Budget Review

- What is the state's return on this investment? Can the department point to specific improvements in efficiencies, materials, methodology or other factors that merit these expenditures? If so, what are the savings brought to the state by them?

Value of Research Discussion

- Session Objectives
- Tracking Research Implementation
- High Value Research Projects
- Focus Area Questions

Louisiana Transportation Research Center

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Focus Area Objective

To discuss ways to effectively monitor, assess, quantify, and disseminate the value of proposed, completed and implemented research. The results of this effort can be used as a performance measure for a research program and provide justification for maintaining and expanding future research funding.

Tracking Research Implementation

REPORT FOR LEGISLATIVE COMMITTEE (MARCH 2008)

Research Studies on Resilient Modulus of Louisiana Subgrades:

Development of Models to Estimate the Subgrade and Sub-base Layers' Resilient Modulus from In-Situ Devices Test Results for Construction Control

Investigation of the Applicability of Intrusion Technology to Estimate Resilient Modulus of Subgrade Soil

Comparative Evaluation of Subgrade Resilient Modulus from Non-Destructive, In-Situ, and Laboratory Methods

The results from these studies have been used by LA DOTD on a several projects to improve design and construction of Louisiana pavement. The primary objective of this research was to develop models to estimate the resilient modulus of base course and embankment soils from in-situ tests. The implementation has improved the quality of pavement design and construction and prevented premature failure of pavements due to the under-design of pavement structures.

Implementation of New OGFC Specification

This study focuses on the application of a new surface mixture that reduces overspray from traffic during a rain and the improved surface friction on wet pavements. The first project was placed on US 71 near Colfax that had 3 fatalities. Since the placement of OGFC 4 years ago, no wet weather accidents have occurred. Also on the second application I-20 in West Monroe, the wet weather accident rate was improved dramatically.

Evaluation of the Effect of Soil Moisture Content on Stability of Reinforced Embankments

This project demonstrates the utility of slope correction using geotextile reinforced embankment technique. District 58 utilized the geotextile reinforcement technique to repair multiple slope failures. A workshop and demonstration project was conducted at the I-10 Bluebonnet interchange in Baton Rouge for District Maintenance Engineers. An instructional video of the slope correction techniques has been produced and may be viewed from the LTRC website.

Identification and Stabilization Methods for Problematic Silt Soils

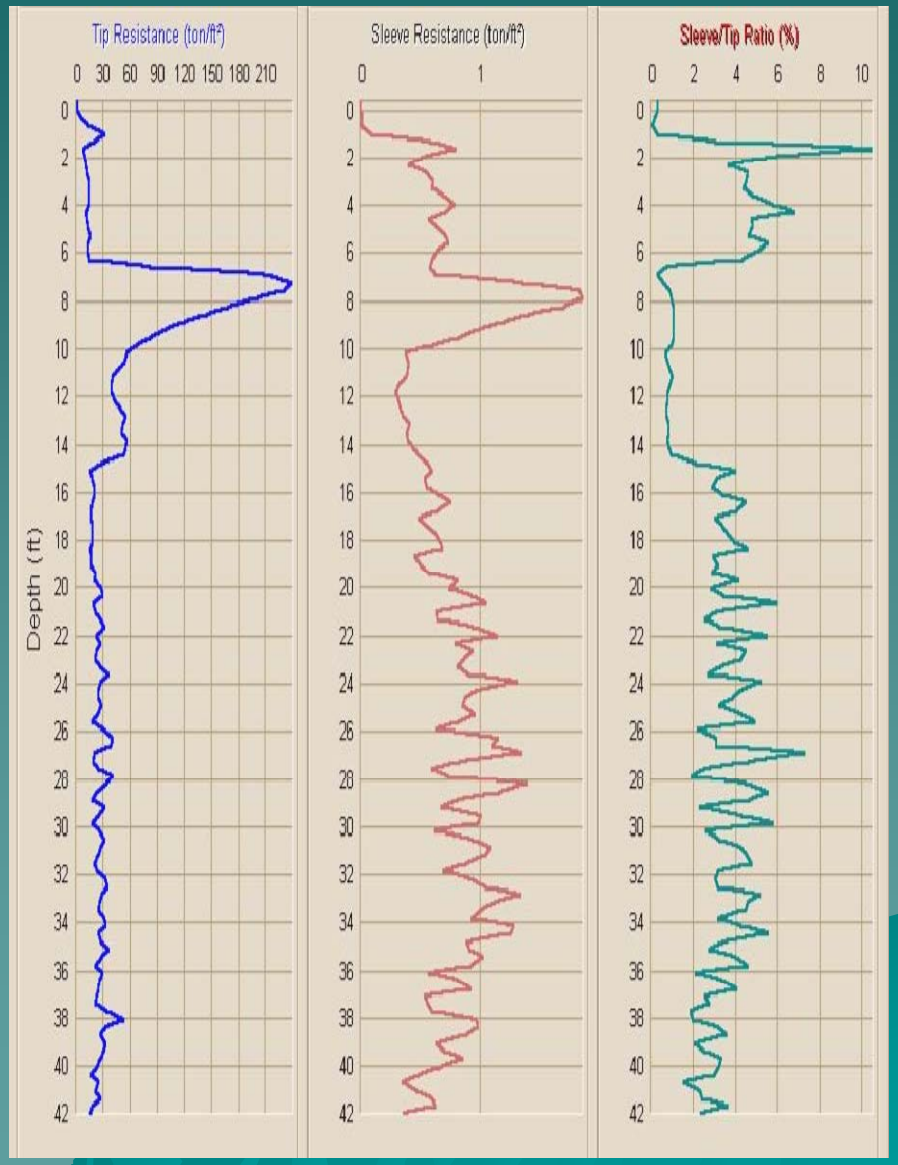
The result of this study changed the definition of usable soils in DOTD specifications for embankment materials used on construction projects. The change is specification eliminates the silts soils that are susceptible to long term strength loss due to excessive moisture and pumping. Pavement structures constructed on new embankments will have longer life due to a stronger foundation.

Stabilization techniques using cement in wet silty subgrades has been incorporated into the DOTD design process producing a stronger foundation and longer life for Louisiana pavements.

High Value Research Projects

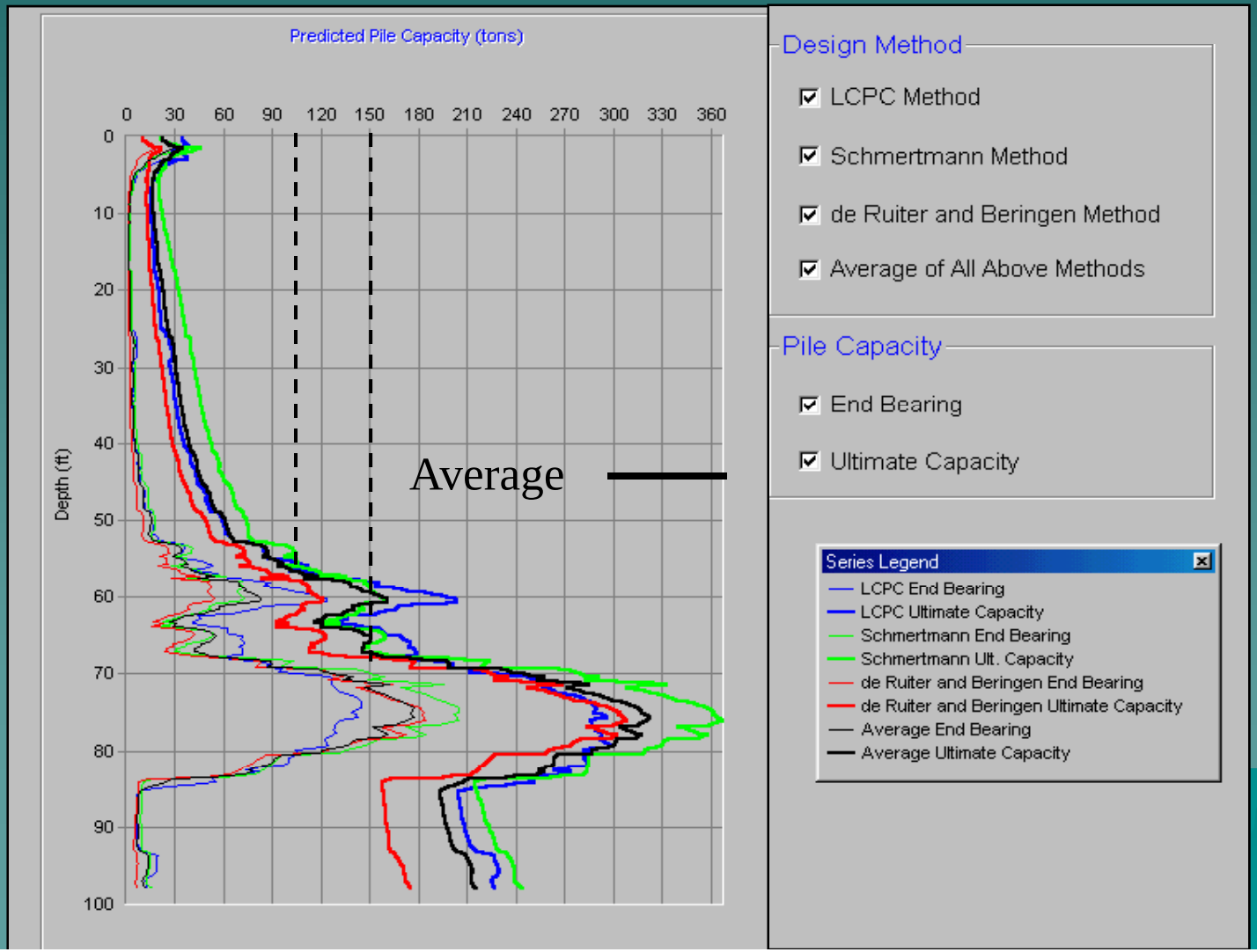
- Better Design Accuracy
- Fewer Construction Costs & Overruns

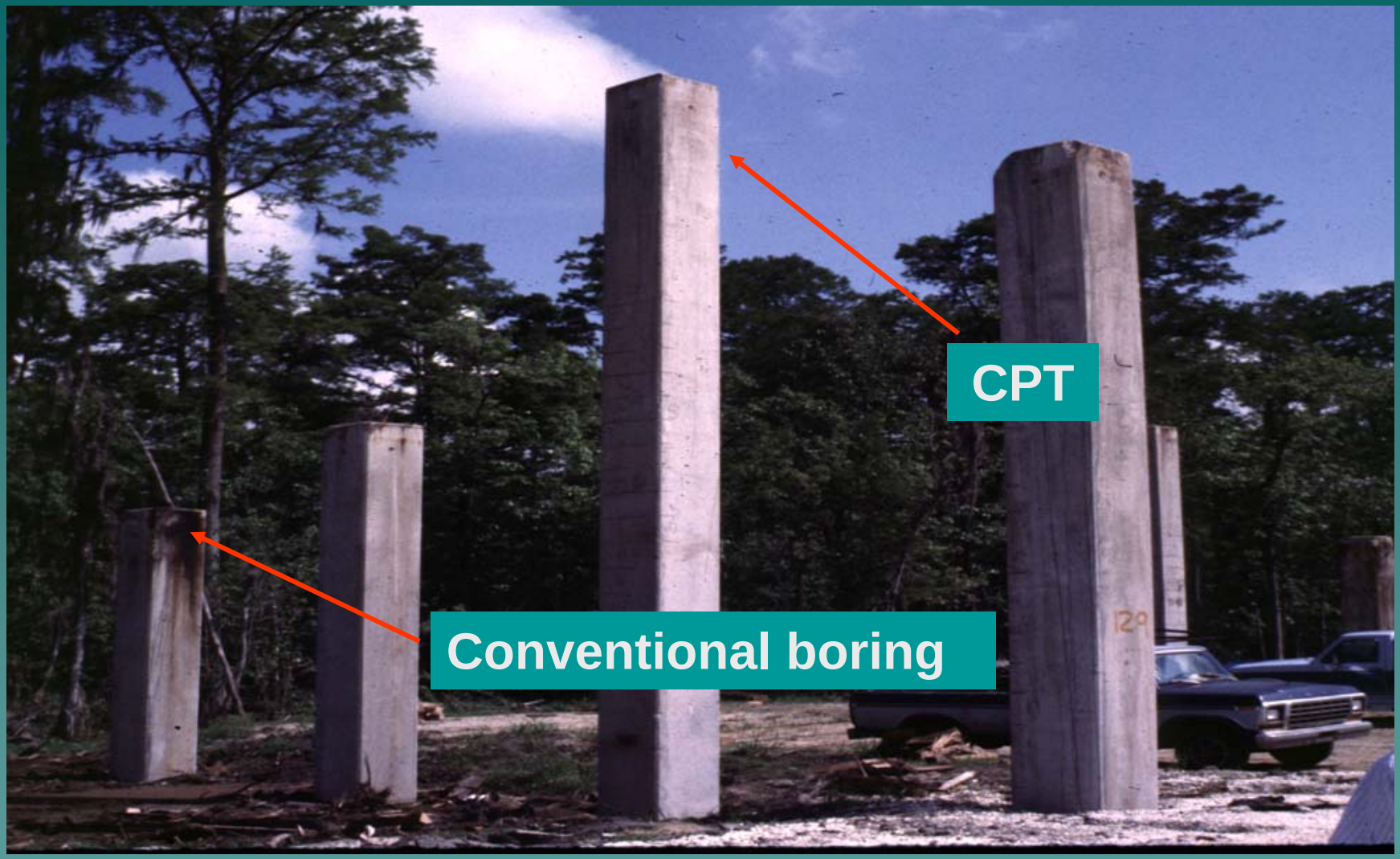
Evaluation of Bearing Capacity of Piles From Cone Penetration Test Data



LPD-CPT software

16” square Precast Concrete Pile





- 90 % of DOTD Bridge Projects
- LA 1 Relocation - >$1,000,000
- I-10 Twin Spans Bridge - > $1,000,000

- Better Performance
- Less costs

LTRC Pavement Research Facility

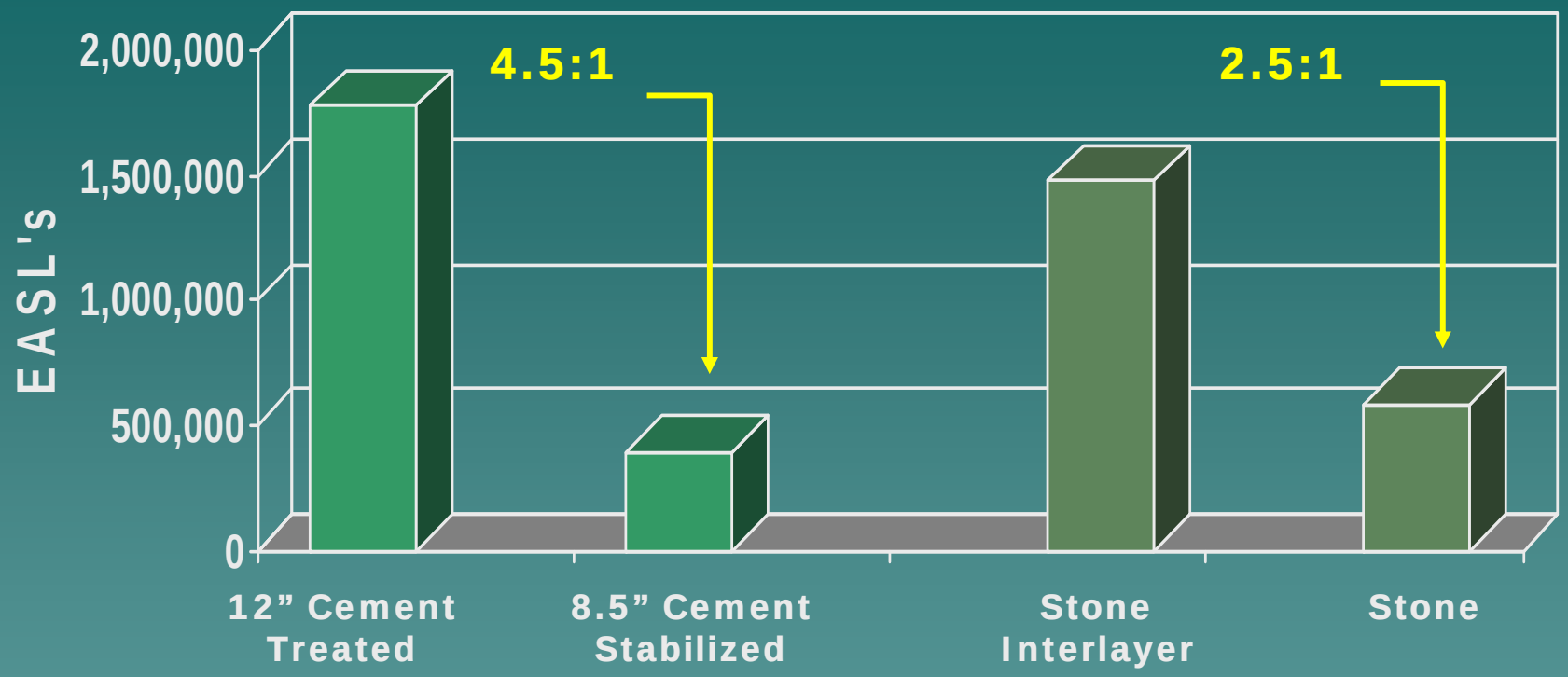
- 20 years of pavement loading can be compressed into months
- Simulates dual tires of single truck axle

Accelerated Loading of Alternate Base Courses

Lane 7
low volume
control

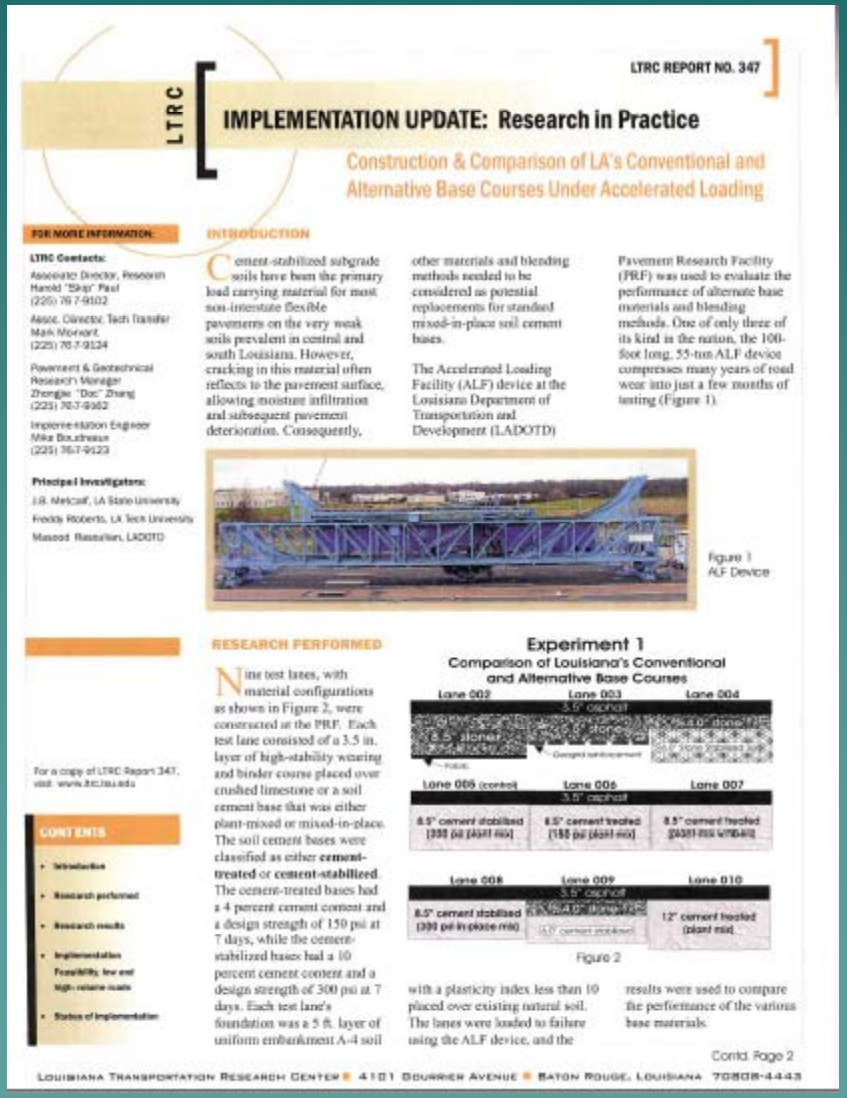
Lane 8
high traffic
experiment

Lane 9
Low traffic
experiment



- 90% of low volume roads use CTB
- 75% of med –high volume roads use stone interlayer
- 3 year life cycle impact: > $10,000,000

Marketing



LTRC REPORT NO. 347

LTRC

IMPLEMENTATION UPDATE: Research in Practice

Construction & Comparison of LA's Conventional and Alternative Base Courses Under Accelerated Loading

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For a copy of LTRC Report 347, visit www.ltrc.lsu.edu

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- Introduction
- Research performed
- Research results
- Implementation Feasibility, low and high volume roads
- Status of Implementation

INTRODUCTION

Cement-stabilized subgrade soils have been the primary load carrying material for most non-interstate flexible pavements on the very weak soils prevalent in central and south Louisiana. However, cracking in this material often reflects to the pavement surface, allowing moisture infiltration and subsequent pavement deterioration. Consequently, other materials and blending methods needed to be considered as potential replacements for standard mixed-in-place soil cement bases.

The Accelerated Loading Facility (ALF) device at the Louisiana Department of Transportation and Development (LADOTD) Pavement Research Facility (PRF) was used to evaluate the performance of alternate base materials and blending methods. One of only three of its kind in the nation, the 100-foot long, 55-ton ALF device compresses many years of road wear into just a few months of testing (Figure 1).

Figure 1
ALF Device

RESEARCH PERFORMED

Nine test lanes, with material configurations as shown in Figure 2, were constructed at the PRF. Each test lane consisted of a 3.5 in. layer of high-stability wearing and binder course placed over crushed limestone or a soil cement base that was either plant-mixed or mixed-in-place. The soil cement bases were classified as either **cement-treated** or **cement-stabilized**. The cement-treated bases had a 4 percent cement content and a design strength of 150 psi at 7 days, while the cement-stabilized bases had a 10 percent cement content and a design strength of 300 psi at 7 days. Each test lane's foundation was a 5 ft. layer of uniform embankment A-4 soil with a plasticity index less than 10 placed over existing natural soil. The lanes were loaded to failure using the ALF device, and the results were used to compare the performance of the various base materials.

Experiment 1
Comparison of Louisiana's Conventional and Alternative Base Courses

Figure 2

Contd. Page 2

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Implementation Update
Research in Practice

Final Report 334 | December 2007

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Evaluation of Bearing Capacity of Piles from Cone Penetration Test Data

Introduction

Knowledge about the underlying soil is important in the design and construction of transportation infrastructures. The Louisiana Department of Transportation and Development (LA DOTD) annually spends millions of dollars on site investigation through subsurface exploration. The quality of subsurface exploration directly impacts the quality and efficiency of the design and construction of foundations for bridges and other structures. The precast prestressed concrete (PPC) pile is the primary foundation element used by LA DOTD to support its bridges.

Conventional site investigation based on soil borings and laboratory testing is expensive and time consuming, often requiring skilled, experienced technicians. Laboratory testing is performed on small, intact samples extracted from the borings. These samples are assumed to be undisturbed. However, sample disturbance is always possible during handling, transportation and/or test preparation. Hence, the laboratory-derived soil parameters may not truly represent the in-situ conditions. As an alternative to laboratory testing, in-situ tests such as cone or piezocone penetration tests (CPT/PCPT)

(cont. page 2)

Fig. 1 Illustration of Cone Penetration Test System

Discussion Topics

- NCHRP 20-63 RPM-Tools
- Accuracy of Analysis
- Standardized practices
- Quantitative vs. Qualitative measures
- Independent vs. internal evaluations
- Research Performance Measurement and Tracking
- Marketing of Research

Focus Area Questions

- Do you determine high payoff potential prior to funding a research project?
- How do you report implementation of research?
- How do you determine if a project has produced a return on investment?
- Do you continue to track research after implementation?
- How do you market your successes?