LTRC
2008 Peer Exchange
May 13 – 15, 2008
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 Subgrade:

- Development of Models to Estimate the Subgrade and Sub-base Layers’ Resilient Modulus from In-Situ Device 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 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 P-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 geosynthetic reinforced embankment technique. District 18 utilized the geosynthetic 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 LTFC website.

Identification and Stabilization Methods for Problematic Silty Soil

The result of this study changes the definition of silty soils in DOTD specifications for embankment materials used on construction projects. The change is a specification eliminates the silty 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

Design Method
- LCPC Method
- Schmertmann Method
- de Ruiter and Beringen Method
- Average of All Above Methods

Pile Capacity
- End Bearing
- Ultimate Capacity

Series Legend
- LCPC End Bearing
- LCPC Ultimate Capacity
- Schmertmann End Bearing
- Schmertmann Ultimate Capacity
- de Ruiter and Beringen End Bearing
- de Ruiter and Beringen Ultimate Capacity
- Average End Bearing
- Average Ultimate Capacity

Predicted File Capacity (tons)

Depth (ft)
- 90% of DOTD Bridge Projects
- LA 1 Relocation - >$1,000,000
- I-10 Twin Spans Bridge - > $1,000,000
• Better Performance
• Less costs
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

| 3.5” Asphalt | 8.5” Cement-Stabilized (300 psi mix) | 4.0” Stone | 12.0” Cement-Treated (150 psi mix) |
| 6.0” Cement-Stabilized |
90% of low volume roads use CTB
75% of med–high volume roads use stone interlayer
3 year life cycle impact: > $10,000,000
IMPLEMENTATION UPDATE: Research in Practice
Construction & Comparison of LA's Conventional and Alternative Base Courses Under Accelerated Loading

Cement-stabilized subgrade soils have been the primary having material for most non-interstate/intercity pavements on various work in the central and south Louisiana. However, cracking in the material often refers 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 blended-in-place soil cement bases. The Accelerated Loading Facility (ALF) device at the Louisiana Department of Transportation and Development (LADOTD) is the pavement research facility (BRF) was used to evaluate the performance of alternate base materials and blending methods. One of the first three of its kind in the nation, the 100-ft long, 25-ton ALF device compresses many years of seal wear into just a few months of testing (Figure 1).

Research Performed
The test lanes, with material configurations as shown in Figure 2, were constructed at the PME. Each test lane consisted of a 0.5 in. layer of high-stability scoring and binder placed over treated limestone or a soil cement base that was either plant-assembled mixed-trusses. The soil cement base were classified either cement-treated or cement-stabilized. The cement-treated base had a 4 percent cement content and a design strength of 150 psi at 7 days, while the cement-stabilized base had a 10 percent cement content and a design strength of 300 psi at 7 days. Each test lane's foundation was a 0.5 ft. layer of uniform embankment 2-A 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.

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Implementation

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 infrastructure. The Louisiana Department of Transportation and Development (LADOTD) 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 LADOTD to support its bridges.

Fig. 1 Illustration of Cone Penetration Test System

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 piezocene penetration tests (CPT/PCPT) can be used...

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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?