RESEARCH
PROJECT CAPSULE
[15-2GT]
May 2015
TECHNOLOGY TRANSFER PROGRAM

Lime Utilization in the Laboratory, Field, and Design of Pavement Layers

JUST THE FACTS:

Start Date:
February 16, 2015

Duration:
12 months

End Date:
February 16, 2016

Funding:
FHWA

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Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used Implementation Potential

PROBLEM

Nearly two-thirds of highways in the United States are constructed on in-place soils with poor or undesirable characteristics. These materials demonstrate undesirable engineering behavior, such as low bearing capacity, high shrink/swell potential, and poor durability. Removing these existing soils can be expensive and/or impractical. Traditionally, modification and stabilization of the soil with lime, cement, and fly ash has been used to facilitate the construction process and to enhance the mechanical properties of the soil. For successful soil modification and stabilization, selecting an optimum content of a suitable stabilizer is critical. Adequate mixing, curing, and compaction are other important factors to achieve satisfactory field performance. Lime is generally more suited for treating plastic clays with shrink/swell potential. The two main reactions from lime are cation exchange and flocculation-agglomeration; both of these reactions significantly improve soil properties and workability.

Lime modification is a time-tested practice in Louisiana to create a working table and its performance has been generally adequate. However, the working table is not assigned a structural coefficient value during the design process. Nevertheless, lime modification and stabilization can offer numerous advantages: improved soil properties, especially for expansive soils; strength gain with time; and possible reduction in pavement thickness if accounted for during the pavement design. The consideration of lime is justified given that laboratory and field studies show that lime-modified subgrades outperform soils without lime modification.

OBJECTIVE

The objective of this study is to review and report the best practices of using lime (granulated, hydrated, slurry) for drying soil, for working tables, and for pavement applications. The project will also document and review pavement design practices in other states that use lime, as well as test methods, field applications, and evaluation techniques for assessing the quality of field construction. Based on this review, the study will provide a knowledge base that can be used to enhance and improve current state specifications.

METHODOLOGY

The research team will conduct a literature review and a nationwide survey; analyze and compare state specifications; summarize lime utilization in structural layers; develop recommendations; and prepare a final report and implementation plan.

IMPLEMENTATION POTENTIAL

The implementation plan will include a strategy to incorporate project recommendations into specifications, QA Manuals, testing procedures, design methods, and policies of the Department. The results of this research can be used to enhance the use of lime-stabilization for pavement layers in Louisiana. This research will impact highway contractors, DOTs, transportation and civil engineers, vehicle drivers, and taxpayers in Louisiana.

Current lime modification practice in Louisiana