VERMONT
AGENCY OF TRANSPORTATION

FACT SHEET

Evaluating the Dynamic Cone Penetrometer for Reclaimed Stabilized Base Characterization

PROJECT TITLE
Evaluating the Dynamic Cone Penetrometer for Reclaimed Stabilized Base Characterization

STUDY TIMELINE
2018 – 2022:
Data Collection by VTrans

2018 – 2022:
Data Evaluation by GEODesign

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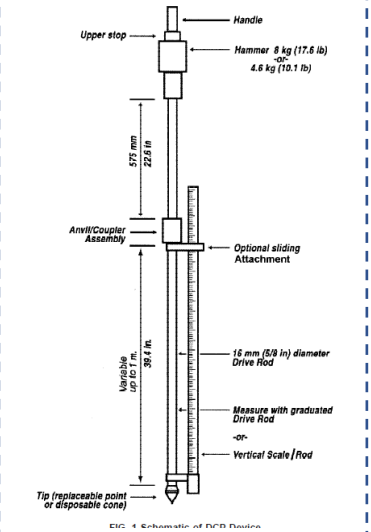
More information about the VTrans Research Program, including additional Fact Sheets, can be found at: http://vtrans.vermont.gov/planning/research

Introduction

The dynamic cone penetrometer (DCP) has long been used as a tool to determine the in-situ California bearing ratio or resilient modulus (M_R) of subgrade materials. For the study at hand, the goal was to evaluate if the DCP could be used as a reliable method to measure in-situ M_R of a reclaimed stabilized base layer for quality assurance purposes.



Methodology

DCP data was collected by VTrans on reclaimed stabilized base material from multiple projects between 2018 and 2021. VTrans also collected falling weight deflectometer (FWD) data in the Spring of 2022 from a selection of these projects with existing DCP data. This data was provided to GEODesign for evaluation and reduction to a M_R value. A statistical analysis was then completed within each data set to evaluate the repeatability of the DCP as a tool for estimating the in-situ Resilient Modulus of the base material. Statistical analysis was also performed to compare the DCP and FWD data.

Conclusions or Next Steps

While the DCP data was shown to be fairly repeatable, no meaningful correlation between M_R values determined by the DCP vs. FWD was established. This was inferred to be due several factors related to the collection of the DCP and FWD data under differing times and conditions. This includes curing of the stabilized base between the time of DCP testing and FWD testing, a lack of asphalt confinement during DCP testing, differing test locations between the FWD and DCP, and a lack of laboratory testing data for correlation. The next steps are recommended to include further study to collect data for comparison in a more controlled manner, with particular emphasis on collecting lab samples, DCP data, and FWD data at the same time, location, and site conditions.

Potential Impacts and VTrans Benefits

Compared with other forms of in-situ testing, the DCP is a quick and low-cost hand tool that can be operated by most field personnel with some basic training. Determining a statistically meaningful correlation between DCP and in-situ M_R of a reclaimed stabilized base material would provide a new, cost-effective tool for VTrans to use for quality assurance and design confirmation purposes on reclaimed stabilized base projects.