EVALUATION OF SOIL WATER CHARACTERISTIC CURVES (SWCC) IN PAVEMENT ME FOR NEVADA'S UNBOUND MATERIALS

By Lindsey Costello

Key Points:

Project Number:
364-16-803
Start Date:
May 1, 2016
Duration:
24 Months
Project Cost:
$155,079

Associate Professor, UNR:
Elie Y. Hajj, Ph.D

Professor, UNR:
Peter E. Sebaaly, Ph.D, P.E.

PROBLEM & OBJECTIVE

Currently, NDOT has a *Manual for Designing Flexible Pavements in Nevada* including an extensive database on the properties and performance of asphalt concrete mixtures. In particular, Pavement ME requires the Soilwater Characteristic Curve (SWCC) to estimate the degree of saturation in an unbound layer and consequently, to predict the resilient modulus (Mr) of the material. Generic values are currently being used by NDOT for the prediction of the SWCCs model parameters for unbound materials in the base layer. These input values need to be specific to the unbound materials used in Nevada so that appropriate predictions are made for the degree of saturation in unbound layers. Hence, the immediate objective for this research study is to develop a comprehensive database of SWCC default input values for locally available unbound materials in Nevada.

METHODOLOGY

Task 1: **Collect Information and Create a Database on Locally Available Unbound Materials in Nevada**

The objective of this task is to identify and collect the necessary information on the typically used unbound material sources by NDOT in pavements.

Task 2: **Conduct Laboratory Evaluation of Unbound Materials**

Based on the findings from Task 1, typical unbound materials (crushed aggregate base, select borrow, and drain rock) will be collected from all three NDOT districts. It is proposed that up to nine different unbound materials from each district will be sampled and evaluated, along with four subgrade materials from each district.

Task 3: **Conduct a Sensitivity Analysis**

A sensitivity analysis will be conducted using the locally calibrated performance models for Nevada to assess the influence of the developed database on the NDOT MEDPG designs. The following Pavement ME runs will be conducted for representative flexible new and rehabilitated pavement structures in all three Nevada districts. Based on the results, recommendations will be made for the subgrade and unbound materials default inputs for SWCC and saturated hydraulic conductivity to be used for Nevada.

Task 4: **Incorporate the Developed Database into the NDOT MEPDG Guide**

NDOT has been working with the UNR Team on the full implementation of the MEPDG for the design of new and rehabilitated flexible pavements for several years. This task will take into consideration the findings and recommendations from the sensitivity analysis conducted under Task 3.

Task 5: **Final Report**

The research team will prepare a final report for the entire project documenting all the findings and recommendations.

IMPLEMENTATION POTENTIAL

The outcome of this research project has a great likelihood of improving pavement performance and, consequently, the overall pavement network in Nevada; supporting NDOT's mission in providing a better transportation system for Nevada. the findings from this study as well as any revisions to the NDOT Pavement ME Manual will be done in close coordination with NDOT. The following deliverables will be produced during the proposed research project:

- Quarterly progress reports.
- Final Report after the completion of Tasks 1-4.
- An extensive database of subgrade and unbound materials properties.
- A sensitivity analysis based on locally calibrated performance models for new and
- rehabilitated flexible pavements in Nevada
- Training activities for the use and immediate implementation of the developed
- database in the Pavement ME Design software.
- Presentation and publication in local/regional/national/international conferences.

Contact Information:
Nevada Department of
Transportation Research Division
Annex 14-15
1263 South Stewart Street
Carson City, NV 89712
(775) 888-7895
https://www.nevadadot.com/doin