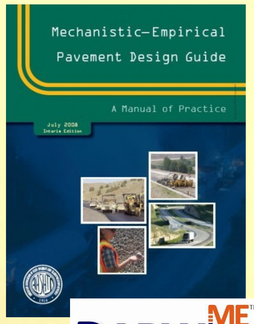


DARWin ME™
Mechanistic Empirical Pavement Design

Instrumentation for Local Calibration of the MEPDG

PURPOSE

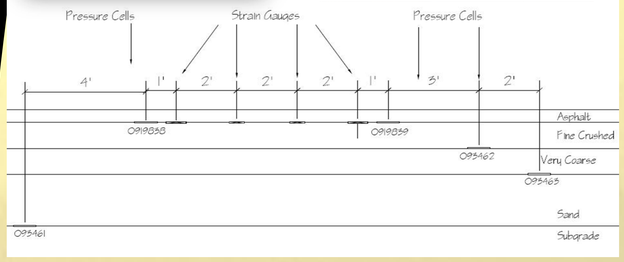
The AASHTO Mechanistic-Empirical Pavement Design Guide (MEPDG) provides the highway community with a state-of-the-practice analysis tool for evaluating pavement structures using project-specific traffic, climate, and materials data. The manual is applicable to designs for new, reconstructed, and rehabilitated flexible, rigid, and semi-rigid pavements.

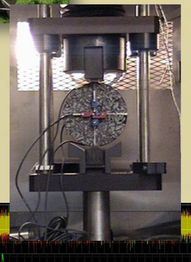
The calibration factors published in the MEPDG are based on national data from Long-Term Pavement Performance (LTPP) sites and accelerated pavement test data from various test tracks. To take full advantage of the power of the MEPDG and obtain the highest degree of reliability, **local calibration is necessary**.

SITE & INSTRUMENTATION

The NHDOT and University of New Hampshire constructed a calibration site along a reconstructed area of the Spaulding Turnpike (NH Route 16) in Rochester beginning in 2009. Appropriate instrumentation was selected, calibrated, and installed based on previous research at facilities including the NCAT Test Track and MnRoad.

Sensors were installed at various stages and depths during construction, including weather instruments, asphalt strain gauges, earth pressure cells, and soil moisture sensors. As the construction project neared completion, pavement temperature probes, axle sensing strips, and weigh-in-motion devices were added.





PRELIMINARY ANALYSES

Inputs for the MEPDG include weather observations, traffic data, base-layer properties, and pavement-layer properties.

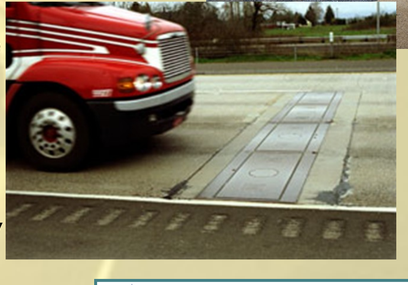
Laboratory materials testing included creep, fatigue, and dynamic modulus testing of the asphalt base mix, and air void analysis of field cores. Similar data were collected for binder and surface courses later in the study.

Initial stress and strain data from un-calibrated traffic, along with calibrated truck passes, were compared to predicted data from two structural response programs similar to those found in the MEPDG. These early results indicated excessive bias and variation in the distress predictions which should be mitigated by performing local calibration.

LOCAL MEPDG CALIBRATION

Damage distress functions for flexible pavements include rut depth, load-related cracking (bottom up, top down), reflection cracking in overlays, and smoothness.

The initial analyses, determination of inputs, calibrated truck runs & data collection, and subsequent MEPDG analysis using in-service traffic loads has enabled researchers to establish initial calibration factors for New Hampshire. Continual monitoring of the pavement performance and instrumentation will occur to provide refinements to those factors. Future instrumentation sites are being considered based upon the experience gained by this study to enable further calibration for all New Hampshire conditions.



BENEFITS

Prior to MEPDG, 80% of states used the 1993 or earlier versions of the AASHTO pavement design guide. These guides were based primarily on road tests conducted in the late 1950s. New Hampshire's current design procedure dates back to 1972.

Implementation of the MEPDG will enable departments of transportation to account for present day traffic levels, climate, materials and construction practices. This will reduce the likelihood of under- or over- designed pavements, resulting in significant cost benefits.

New Hampshire DOT
Department of Transportation

University of New Hampshire