MEPDG Implementation Efforts
NCDOT
Judith Corley-Lay
Pavement Management Unit
Outline

• Building an MEPDG Implementation Group
• Who Needs to Work Together?
• Setting a Realistic Goal
• Getting What We Need for Level 2
• Current Status
• Future Efforts
• Summary
Modules of the MEPDG

- Traffic: Based on traffic stream, not ESALs.
- Materials: Dynamic modulus for AC, resilient modulus for unbound layers.
- Climate: Uses the Integrated Climatic Model with virtual weather stations.
- Calculations of stress/strain, damage and iterate over time.
Who Needs to Work Together?

- Pavement Designers
- Materials and Tests
- Traffic Data Collection and Forecasting
- Geotechnical Engineering
- University Researchers
- Material Suppliers and Interest Groups
Three Tiers of MEPDG

- Level 1: requires site specific traffic, materials, climate, etc. Highest level.
- Level 2: requires local estimates of material properties, climate and traffic.
- Level 3: based on default values (the default values in the MEPDG are based on a national calibration).
Level 2: A realistic goal

- We do design of pavements well in advance of lettings. We do not have in place material properties... in fact, we do not know what quarry will be used, what asphalt supplier, etc.
- Level 2 will give us the benefit of local calibration for local materials. We can use Level 1 input if available.
Key Benefits of New Method

• Look at Failure Mechanisms for various designs.
• Evaluate the impacts of loadings including overweight trucks, or increased traffic streams on pavement life.
• Method is flexible to new materials for all layers.
Components of MEPDG Efforts

- Dynamic Modulus: Began with Research Project to determine Dynamic Moduli of typical NC asphalt mixes.
- Development of Implementation Plan: included wide variety of units that will be affected.
Current Work

• Local calibration project:
  Selected 10 projects let in 1995. Provided plans, mix information, etc. Also provided Pavement Condition Ratings since construction. Project is scheduled for completion in August 2009.
Current Efforts

• Development of Traffic Data Input Requirements: evaluation of current data sources and quality, development of quality control methods for the very large traffic datasets, sensitivity of MEPDG to various traffic components, level 2 traffic methods, clustering for level 3. Project completion in summer 2009.
Additional Work

- Local Values of Moduli for other Materials.
- Comparison of Service Life Predicted by MEPDG with Known Performance for broader range of projects.
- Concrete characterization: Coefficient of Thermal Expansion.
Training Aspects

• Several pavement engineers have taken graduate course that stresses MEPDG. New-hire engineers will be encouraged to take this class, funding permitted.

• Additional training includes NHI training, web based seminars, FHWA sponsored conferences and TRB workshops.

• Training for new hires will be a challenge.
Example: Cost Impacts of Overweight Loads

- Used 5 typical sections based on coring records: Interstate, High Volume Primary, Low Volume Primary, High Volume Secondary, and Low Volume Secondary.
- Selected 2 Traffic streams for each road class.
- Used typical NC material properties.
Example (continued)

- Preselected treatment options for failure mechanisms. For example, if failure is in asphalt rutting, then mill 2” and replace with asphalt concrete.
- Calculated time to failure for each pavement section for each traffic stream and the PW of the preselected treatment.
How we considered Overweight Trucks

Normal Distribution of Gross Weight

Gross Vehicle Weight
To Get the Without Overload Condition...
Example of Results

- Interstate pavement category (1165 miles) failed in 7.08-9.08 years with overweight vehicles.
- Changed to 7.83 to 10.0 years when overweight vehicles were moved to legal.
- $11,899,000 per year impact.
- Total for all categories: $77.5 million.
Summary

• The new design procedure allows consideration of new materials, truck configurations, and local climatic conditions.
• Requires high levels of communication between traffic, materials, geotechnical and pavement designers.
• Each agency will need an Implementation Plan.
Summary

• New procedure will require higher level of education or training for pavement design.

• Implementation will not be instantaneous, but if we begin collecting data now, we will be able to provide local calibration within 5 years. In the meantime, can address some thorny questions.
Are there any Questions?

If you wish to contact me by email:

jlay@ncdot.gov