

Using PMS Data to Calibrate & Validate the New Design Guide

Study for FHWA by AgileAssets Inc. with:

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- Other FHWA participation: Stephen Gaj, Kathy Petros, Leslie Meyers & Gary Crawford

DOTs Contacted

In first phase of project:

- Mississippi,
- Washington,
- Kansas, and
- Florida

As result of strong State interest project was expanded to include:

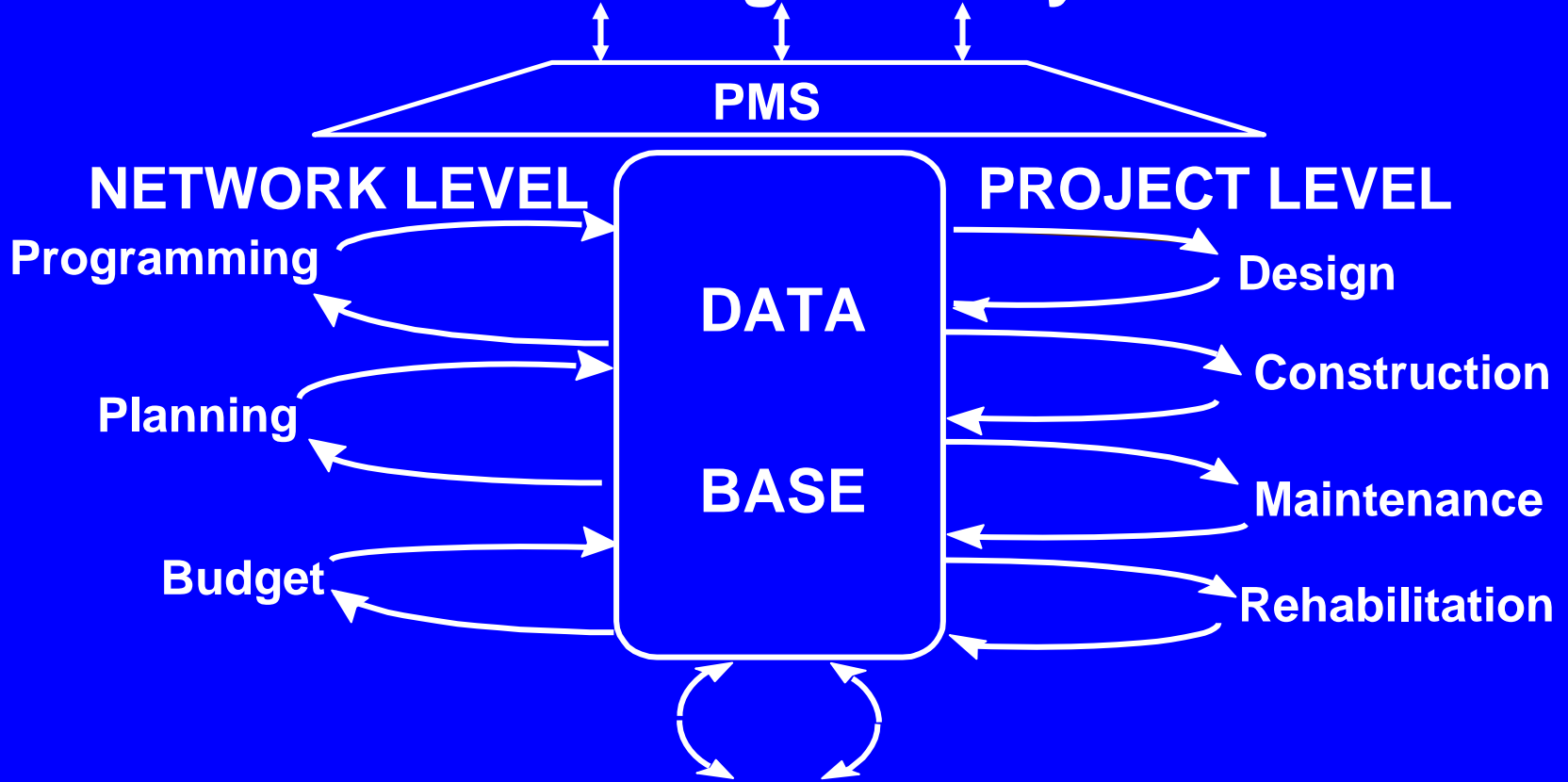
- North Carolina,
- Pennsylvania,
- Minnesota, and
- New Mexico

Project Timeline

- Febr 2005 – Start of Project
- Nov 2005 – Visits to 8 States completed
- Aug 2006 – Workshop on Project Findings
- Sept 2006 – Final Report due

Components of PMS

Broader Management Systems



**Engineering Applications
Including Calibration of
New M-E Design Guide**

Purpose of PMS Engineering Analysis

The use of pavement management data to evaluate and improve **structural design methods**, materials, mix designs, construction, preservation strategies, rehabilitation, and preventive maintenance of pavements.

Previous Project of PMS Engineering Analysis

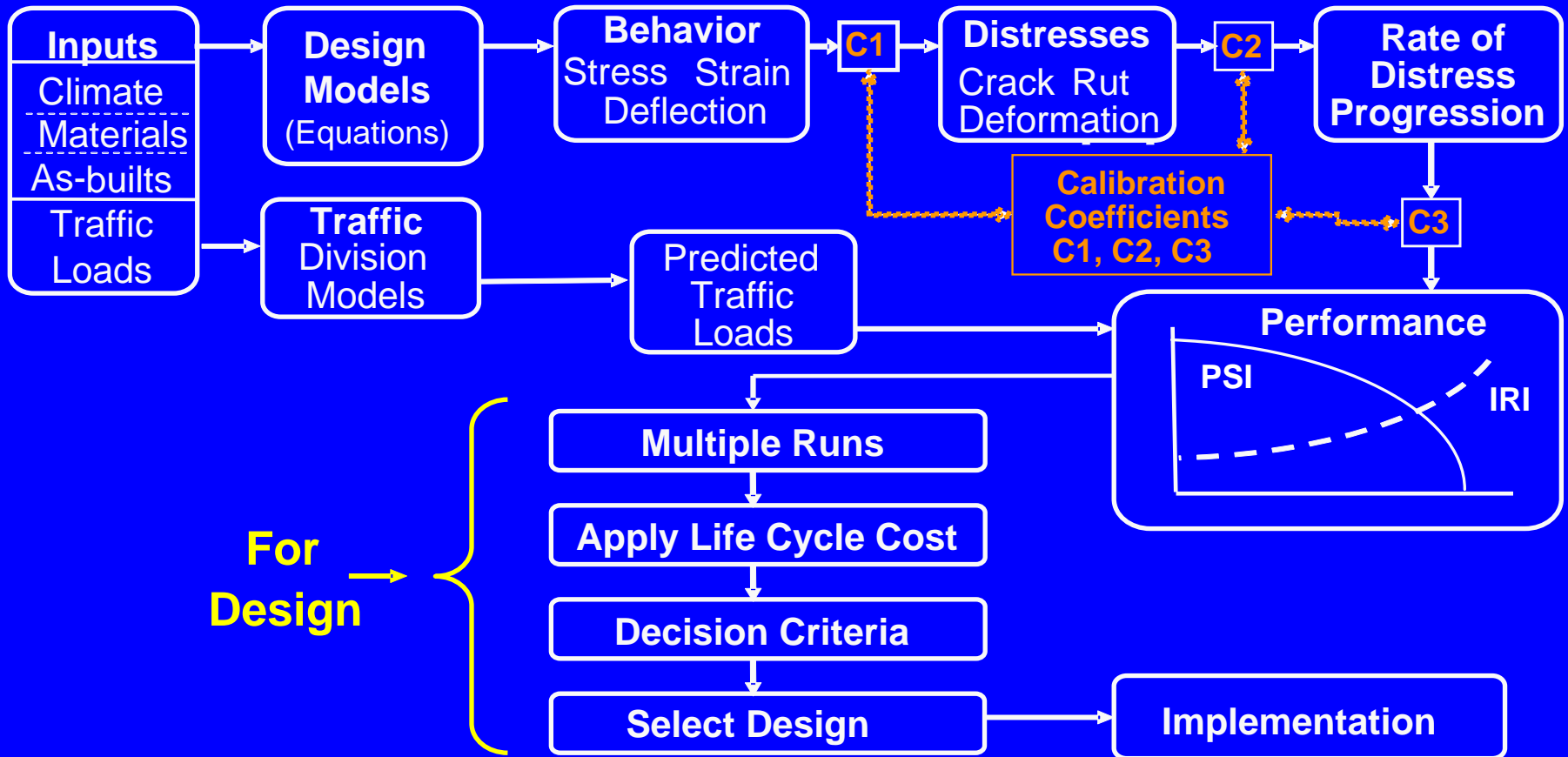
to validate Superpave Concepts completed in 2002
by same AgileAssets Research Team with Report:

***“Evaluating Superpave Using Performance,
Materials and Construction Data”***

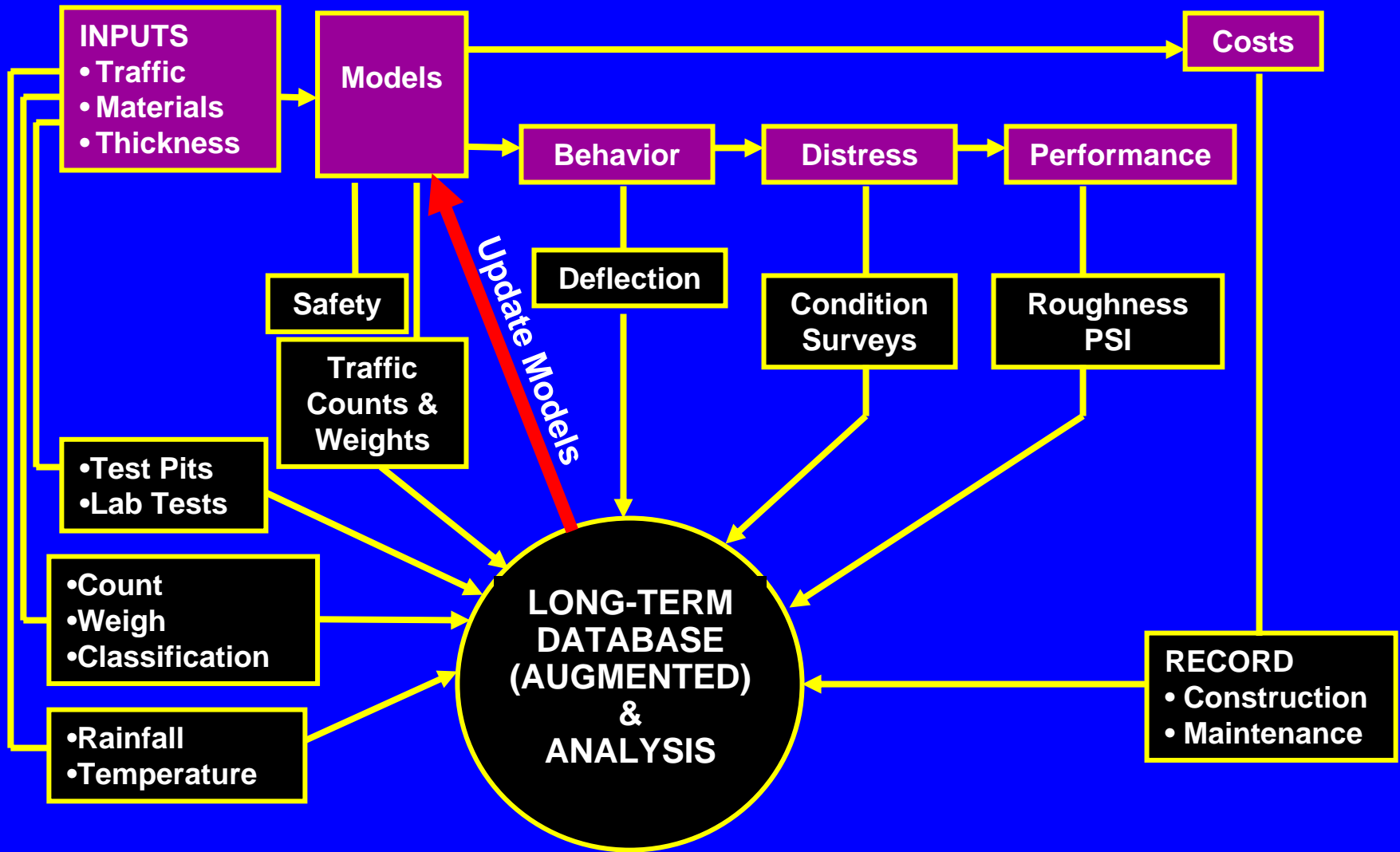
Available at FHWA website

www.fhwa.dot.gov/pavement/management/pms.cfm

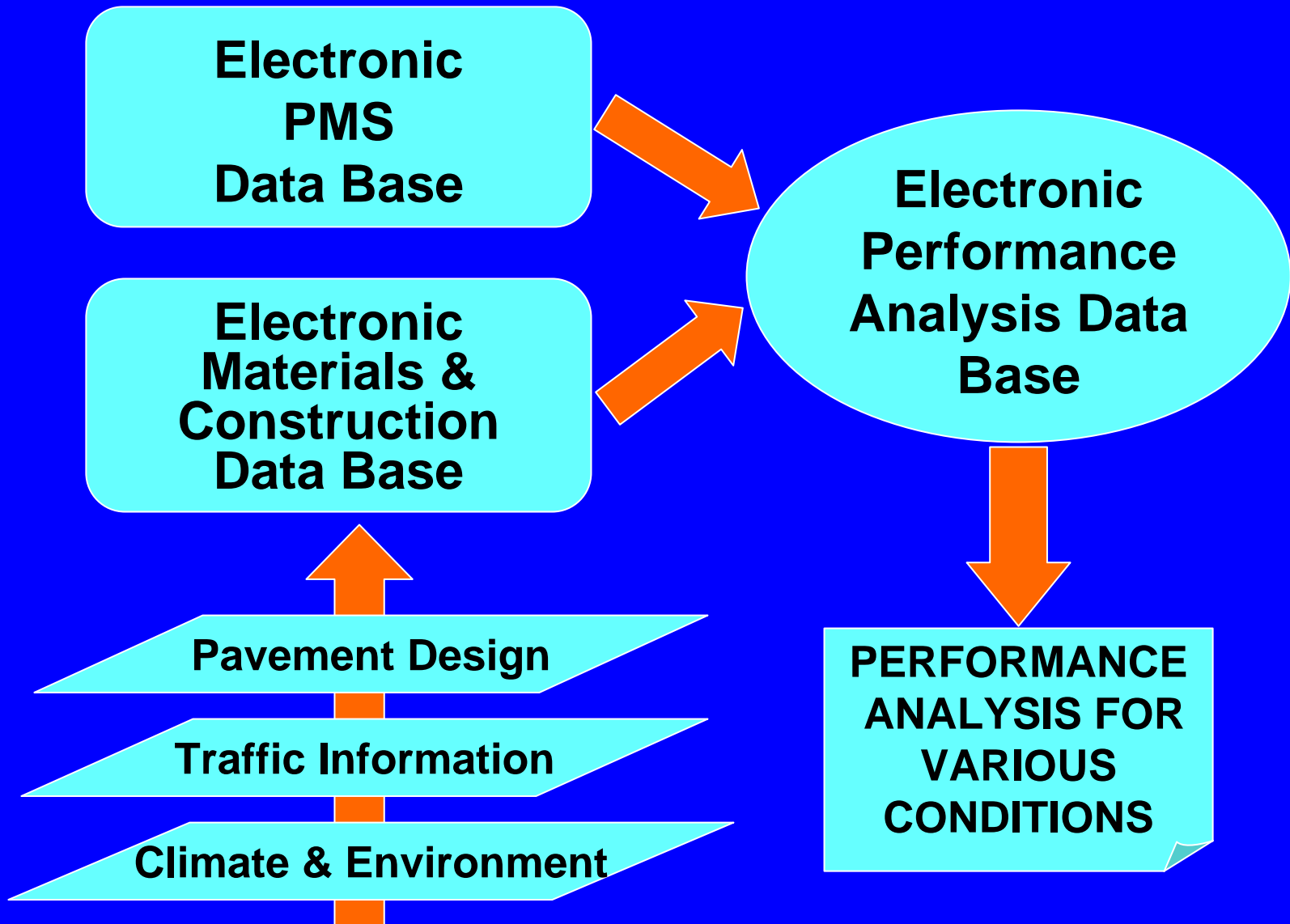
Project Level Pavement Design Method



Flow Pattern of PMS Related Data



Concept for Linking Databases



Electronic PMS Database

- Common referencing is needed with Project Number, exact Location and Date
- Location with GPS or mile post, Lane and Direction
- Climate and Traffic Data (Load Spectrum or ESAL and ADT)
- Age of original pavement and last rehab date
- Type of wearing course
- Performance Data for Roughness and distress, linked to exact location

Electronic Materials and Construction Database

- Common referencing is needed with Project Number, exact Location and Date
- Batch numbers linked to location in pavement
- Mix data, designed and in-place
- Layer thicknesses, designed and as-built
- Subgrade information
- Drainage details
- Maintenance details

Main Activities So Far

- Good detailed meetings with eight States
- Coordination with NCHRP projects:
 - 1-40b Local Calibration Guidance, PI: Harold Von Quintus
 - 9-30 Experimental Plan for Calibration and Validation of HMA Performance Models
- Monitor FHWA Community of Practice website for New Pavement Design Guide

Preliminary Observations

1. States generally have capability for long term calibration using PMS data,
2. Several States are using the software to gain experience or for engineering analysis and forensic studies
3. Two States are awaiting “Release 1.0”, the corrected version of the software expected March-April 2006

Preliminary Observations

4. Generally States plan Level 2 materials input data based on correlation and/or laboratory studies of their materials
5. A number of States plan to do correlations for complex testing, involving Universities and Research facilities

Preliminary Observations

6. Traffic data are reportedly available; usually requiring coordination with a different Section or Division. Generally Level 3 or Level 2 input developed from existing data
7. Several States reported problems with WIM equipment
8. Several States have implementation contracts with consultants

Preliminary Observations

9. Some States sponsor research on materials, performance models and calibration/validation of the Guide at their Universities
10. Most States are disappointed with rehab and overlay design in the New Guide
11. DOTs with close organizational ties between pavement management and design have best prospects for calibration.

Calibration/Validation

No need to supplement all Sections. New data fields needed only for new Sections designed and built using the New Guide:

- Design values for all relevant parameters
- As-constructed values for the same parameters
- Annual measurements and records of traffic load spectra
- Annual weather data or tie to NOAA

Analysis of Calibration Sections

1. Early recording of data after construction and evaluation will prevent “build-up” of backlog.
2. Effects of variables can be analyzed by accessing and linking various Databases
3. Assemble Database for enough sections, the more the better, large sample statistics very powerful
4. Several States can combine Data with good National coordination.

Final Report

Final Project Report will present a viable plan to start setting up a long-term enhanced database for new Sections designed using the New Guide to be used for calibration.

Prior data from existing Sections can be added if detailed data is gathered (some States plan this)

Advantages of Concept for a DOT

- Existing pavement network used as Road Test:
 - Evaluate New Design methods, materials, techniques, etc
 - Produce more accurate Performance Prediction Models
- Pavement preservation done more accurately
- Data entered only once, and complete data set allows easier storage, retrieval, linking, analysis and reporting.