

MnPAVE Training

Presentation 3

Climate, HMA Material and Transfer Function Calibration

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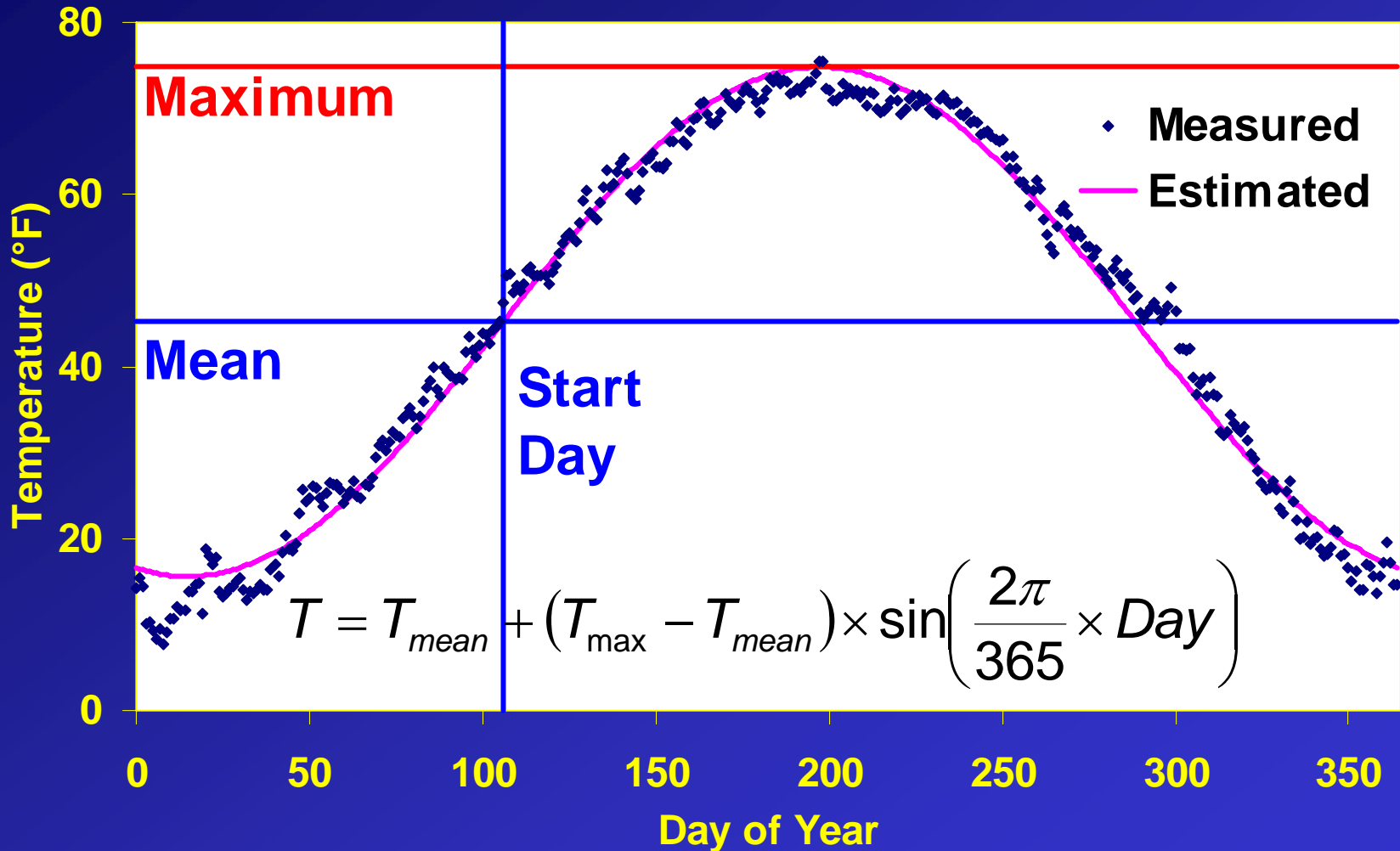


MnPAVE – Climate

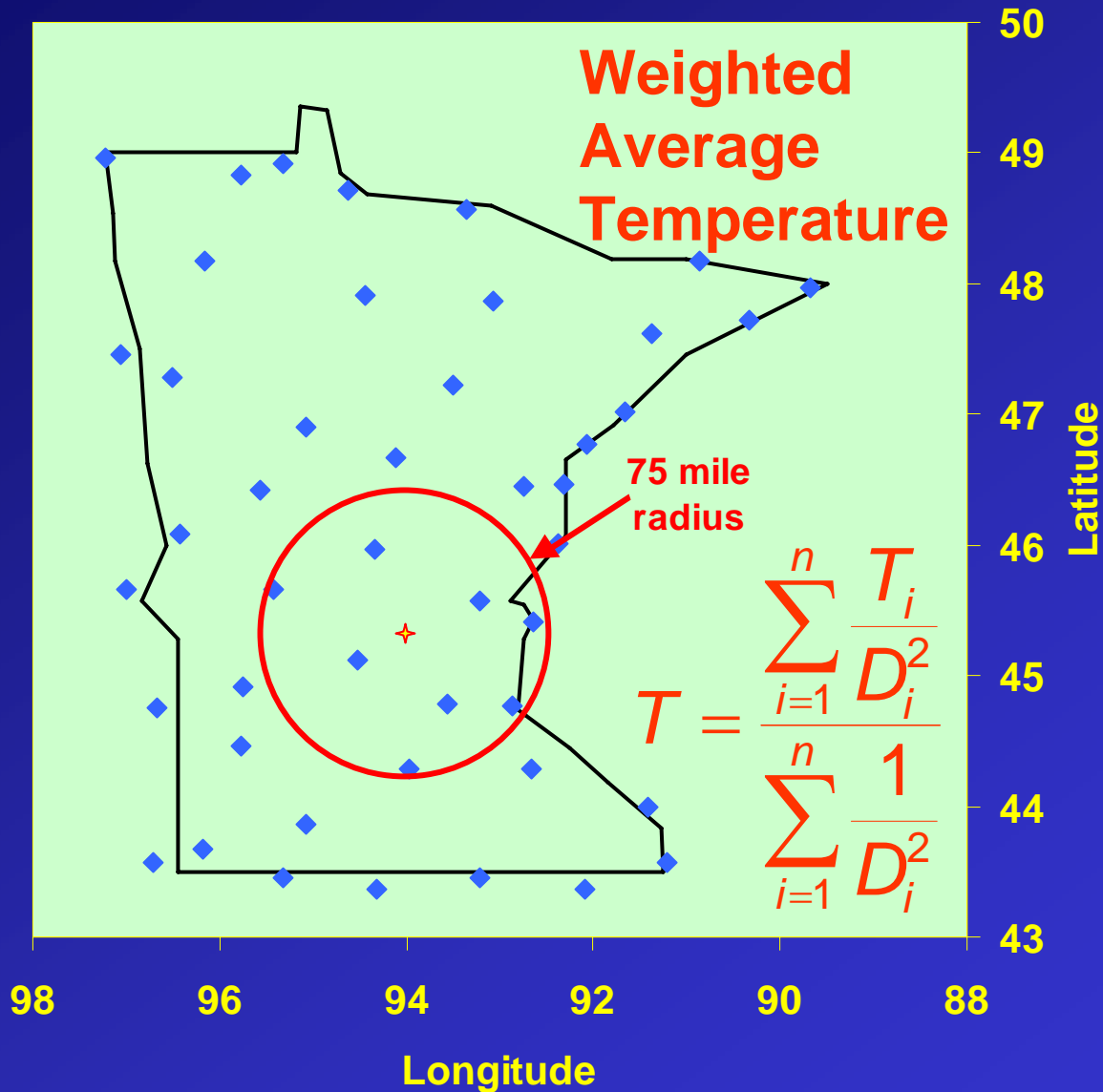
- Data from 47 Weather stations
- Average daily temperatures from 1971 - 2000
- Model annual temperature trends
- Determine season lengths, temperatures and HMA moduli
- Estimate values at any point in state



30-Year Average Daily Temperatures (1971 - 2000) Marshall, MN



Weather Stations



HMA Dynamic Modulus

Air Temperature



empirical

HMA Temperature



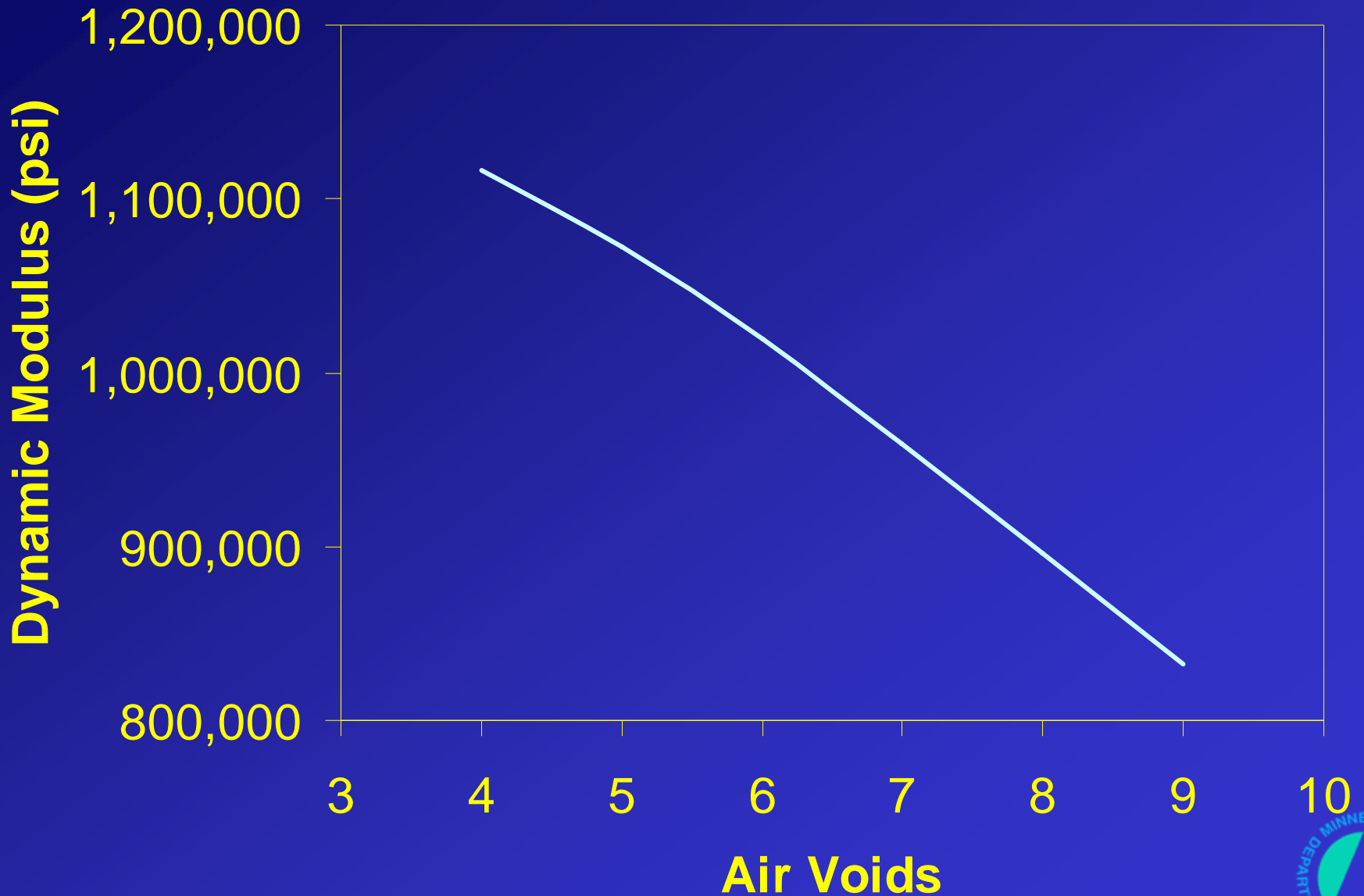
empirical

HMA Dynamic Modulus

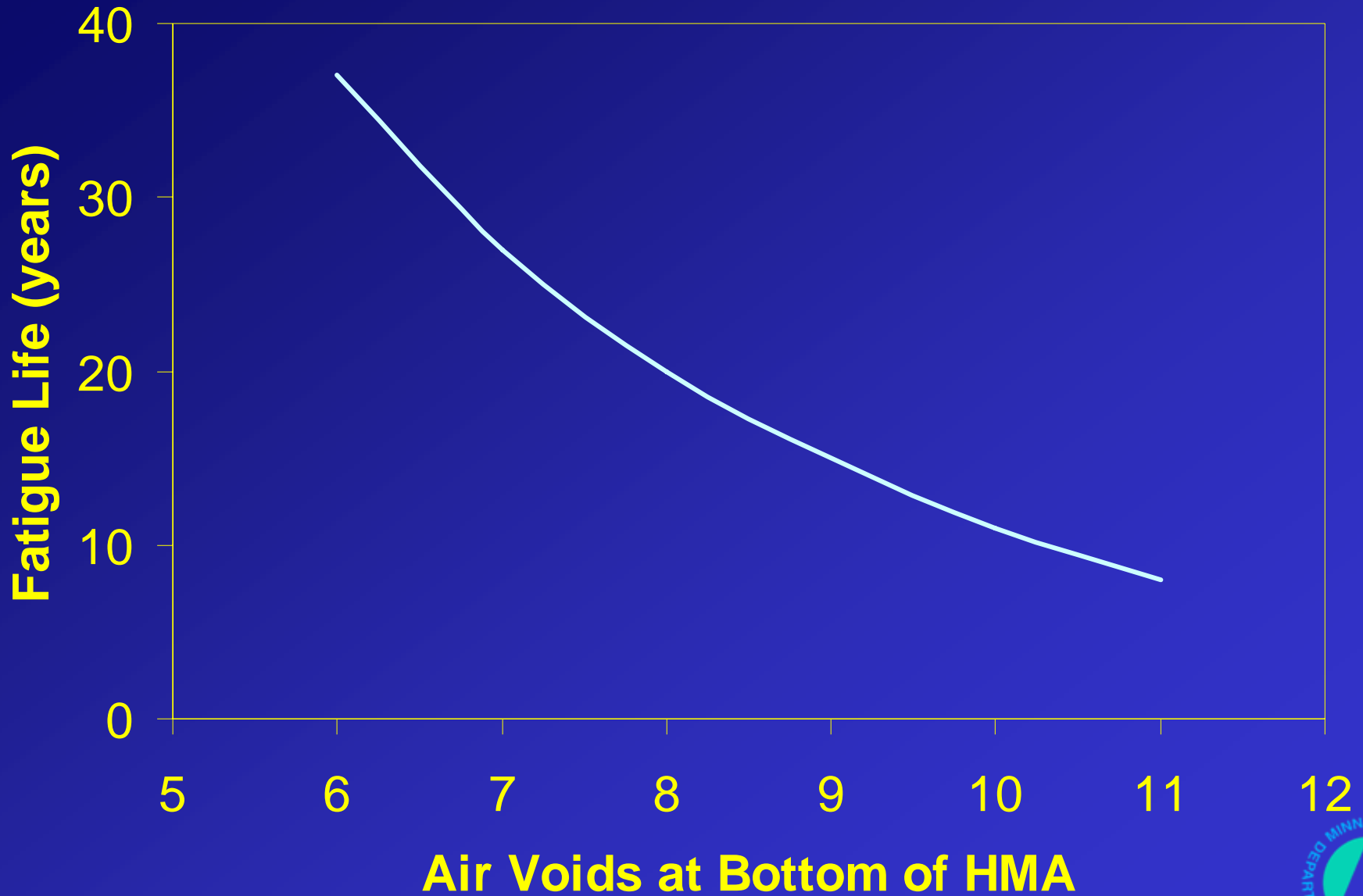
HMA Dynamic Modulus is a function of:

- Temperature
- Air voids
- Effective binder content
- Gradation
- Vehicle speed

Effect of Air Voids on Dynamic Modulus



Effect of Air Voids on Fatigue Life



MnPAVE – Calibration

- **Fatigue and rutting transfer functions**
- **Not many failures in Minnesota**
- **Preliminary calibration based on R-Value designs**

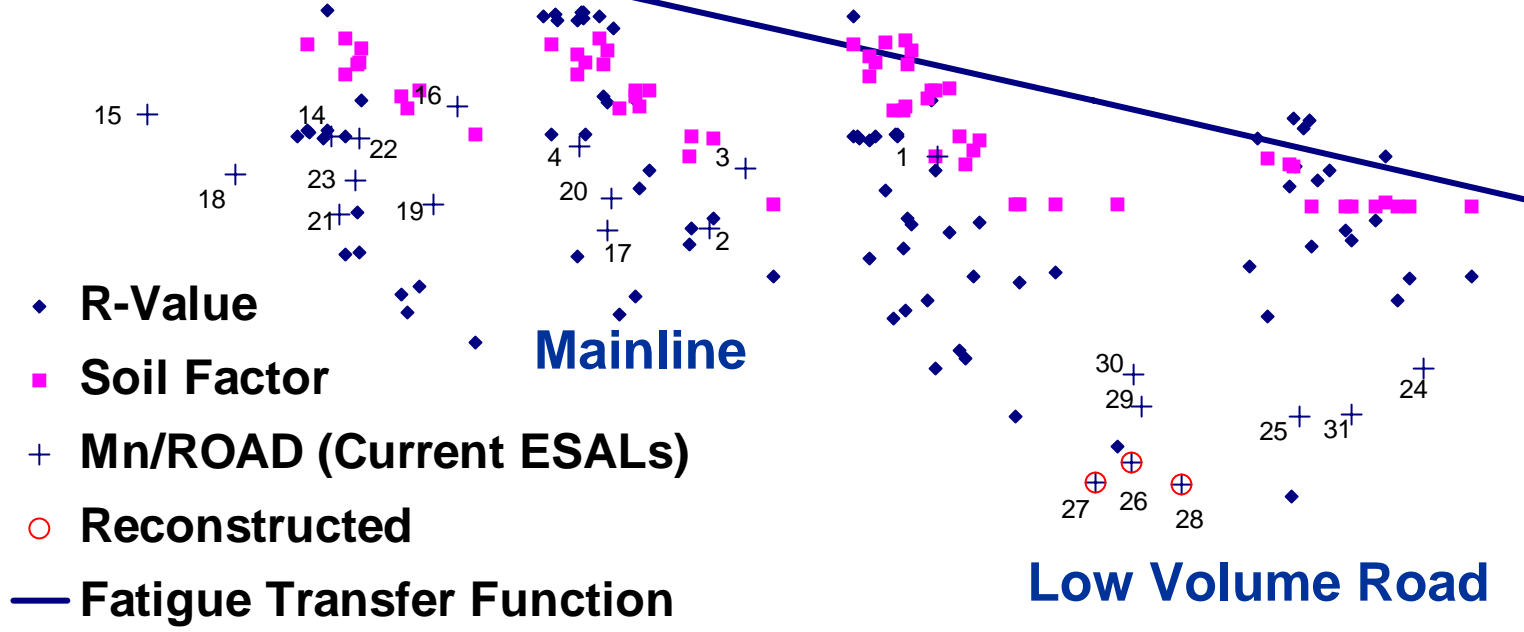


R-Value Fatigue Calibration

Normalized Repetitions

failed

not failed



- ◆ R-Value
- Soil Factor
- + Mn/ROAD (Current ESALs)
- Reconstructed
- Fatigue Transfer Function

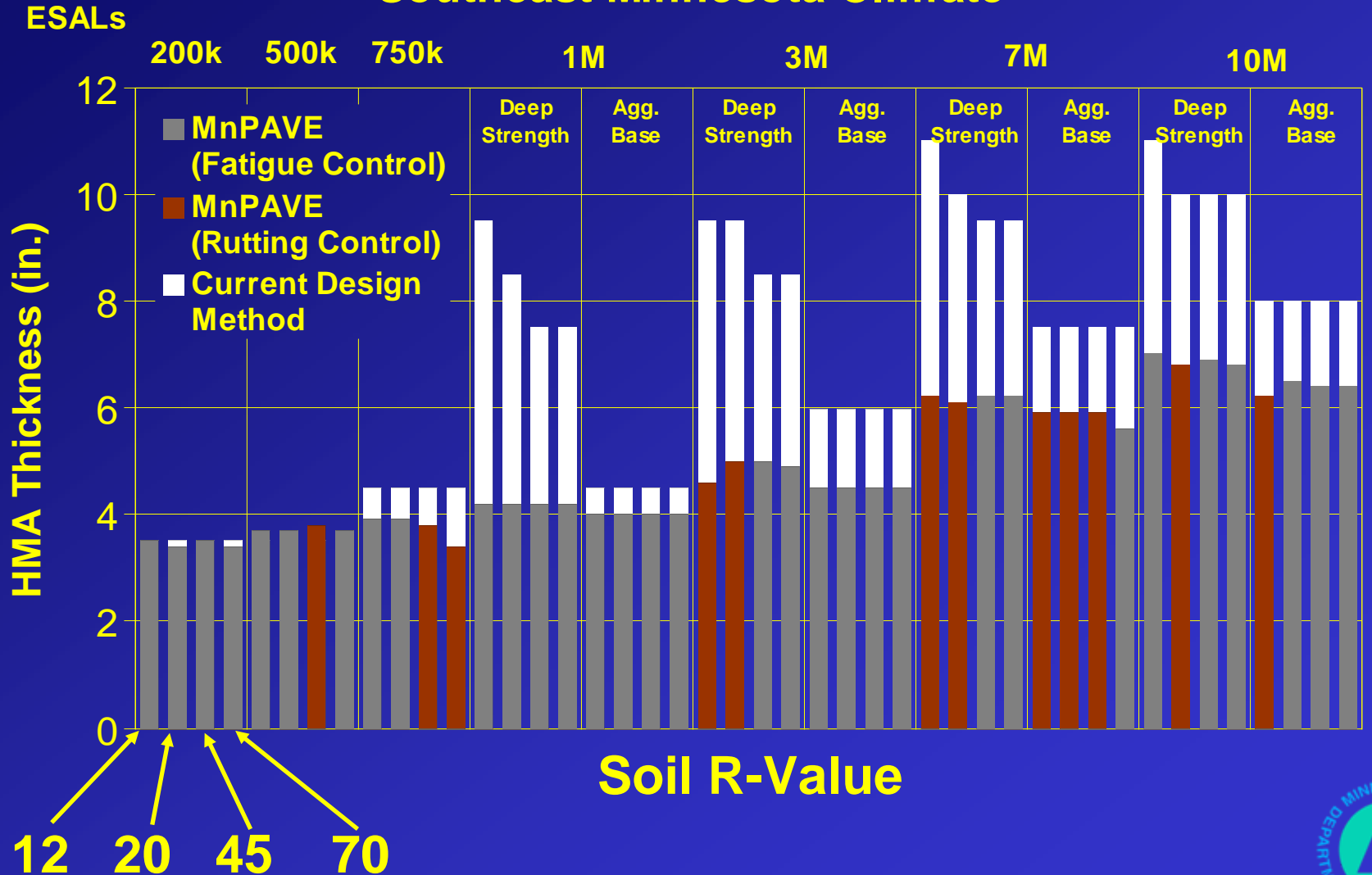
Thicker ← → Thinner



MnPAVE Calibration

MnPAVE & R-Value HMA Thickness

Southeast Minnesota Climate



Download MnPAVE

<http://www.dot.state.mn.us/materials/mnpave>

