



Pavement Type Selection

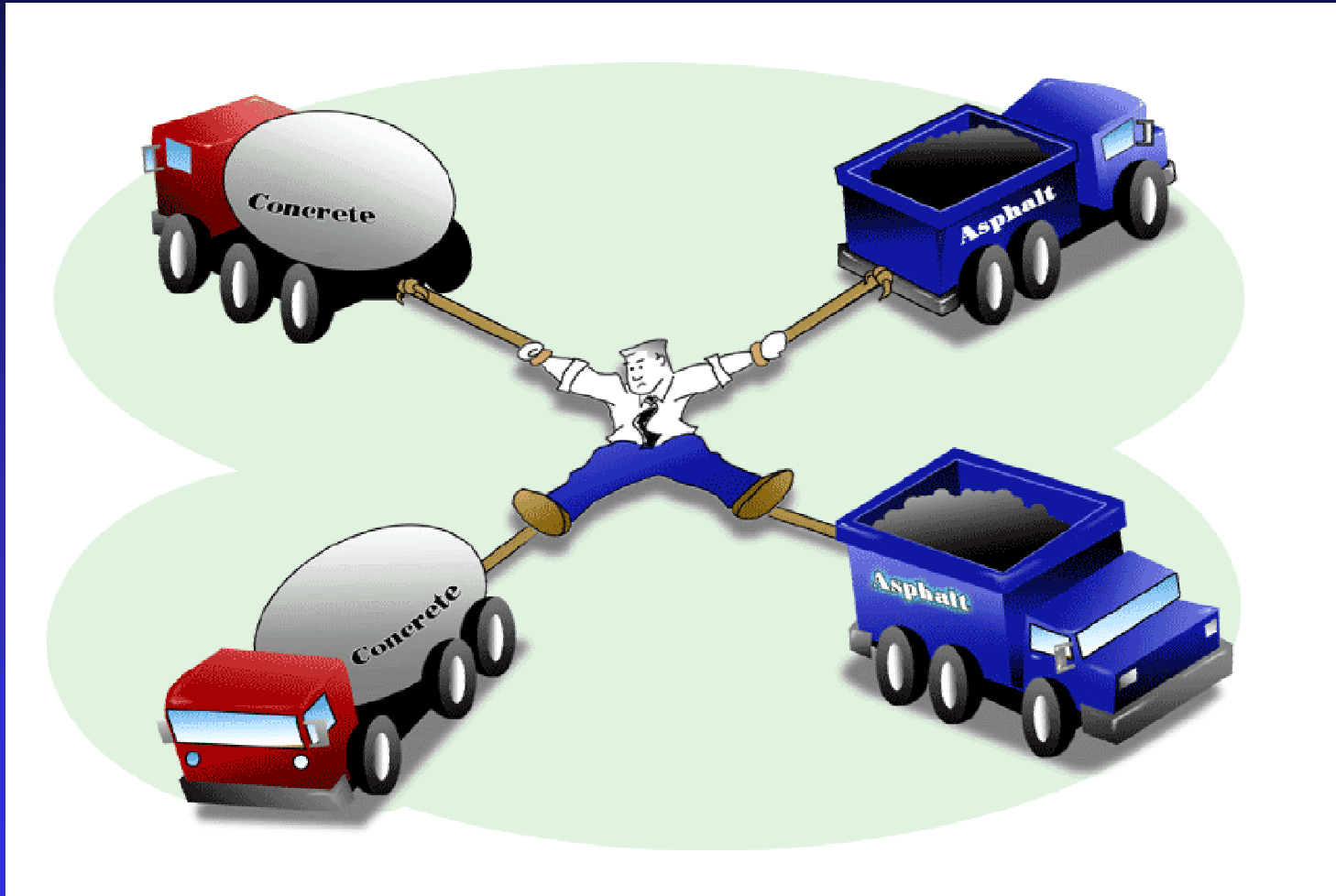


Southeastern States Pavement Management
and Design Conference

June 21, 2005

Kentucky Transportation Cabinet
Division of Highway Design

Pavement Type Selection Is One Large Tug-of-War



What were we doing?

Major Projects (Interstates, Parkways, NHS)

- Central Office staff performed analysis and prepared pavement designs
- Assistant State Highway Engineer approved

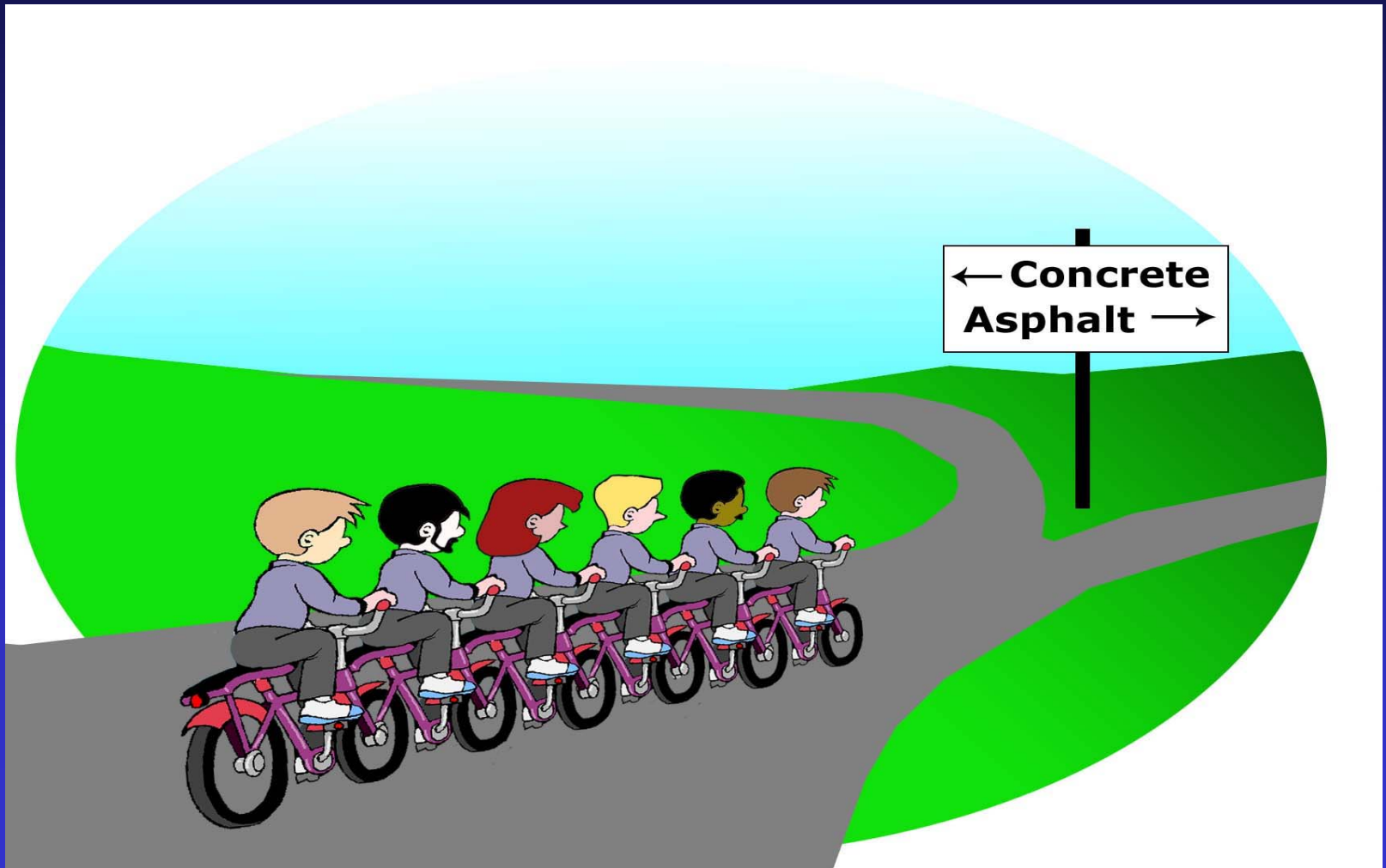
Minor Projects (Off NHS)

- Districts/Consultants performed analysis and prepared pavement designs
- TEBM for Pavements approved

The rest of the story....

- Plans prepared and project advertised
- Industries challenged design/type selection
- Central Office staff defended
- Sometimes Pavement Type was changed or Alternate pavement type were bid

Is there a better way to decide?



Pavement Working Group

- Formed in Spring 2002 at the request of the State Highway Engineer
- First meeting April 11, 2002
- Met with paving industries in August 2002
- Presented recommendations to State Highway Engineer in October 2003

Working Group Members

KYTC Members

Division of Design

Division of Maintenance

Division of Materials

Division of Construction

Districts

Other Members

FHWA

Transportation Center



Primary Goals For Pavement Type Selection

- Cost Effective Pavements
- Stimulate Competition
- Fair And Equitable Treatment Between Industries
- Provide Well Performing, Durable Pavements

Group Consensus

It is in the best interest of the Cabinet and the taxpayers to maintain both the asphalt and concrete paving industries in Kentucky.

Why?

- Constructability
- Durability
- Economic Benefits

Pavement Type Selection Factors

- Principal Factors
 - Traffic
 - Soils Characteristics
 - Weather
 - Opportunities for Recycling
 - **Construction Considerations**
 - **Cost Comparison**

Life Cycle Cost Analysis

Previous KYTC Procedures



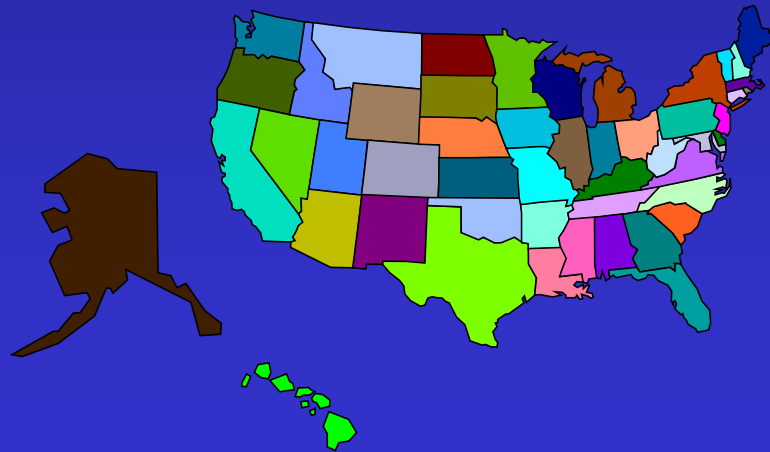
Past LCCA Procedures

- Based on FHWA DP 115 Report (1998)
- 40-year Analysis/Design Period
- Discount Rates 0-10% Analyzed
- User Costs included in analysis
- Deterministic Method
- Excel-based program created by KTC

***Decision Support Tool Only**

What are other states doing?

Life Cycle Cost Analysis



Experiences In Other States

- Initial Design Period
 - 20-40 Years
- Analysis Period for LCCA
 - 35-50 Years
- Discount Rates for LCCA
 - 4% Typical; Range 0-10%
- Asphalt Rehabilitation Cycles
 - 10-15 Years

Experiences In Other States (cont.)

- Concrete Rehabilitation Cycles
 - 10-30 Years
- Salvage Value
- User Costs
- When Is LCCA Not Determinate?
 - 5% to 20% Variation

Industry Concerns

- Design Methodologies
- Parameters for Life Cycle Cost Analyses
- Rehabilitation Cycle Intervals
- Constructability Concerns



Pavement Working Group Recommendations

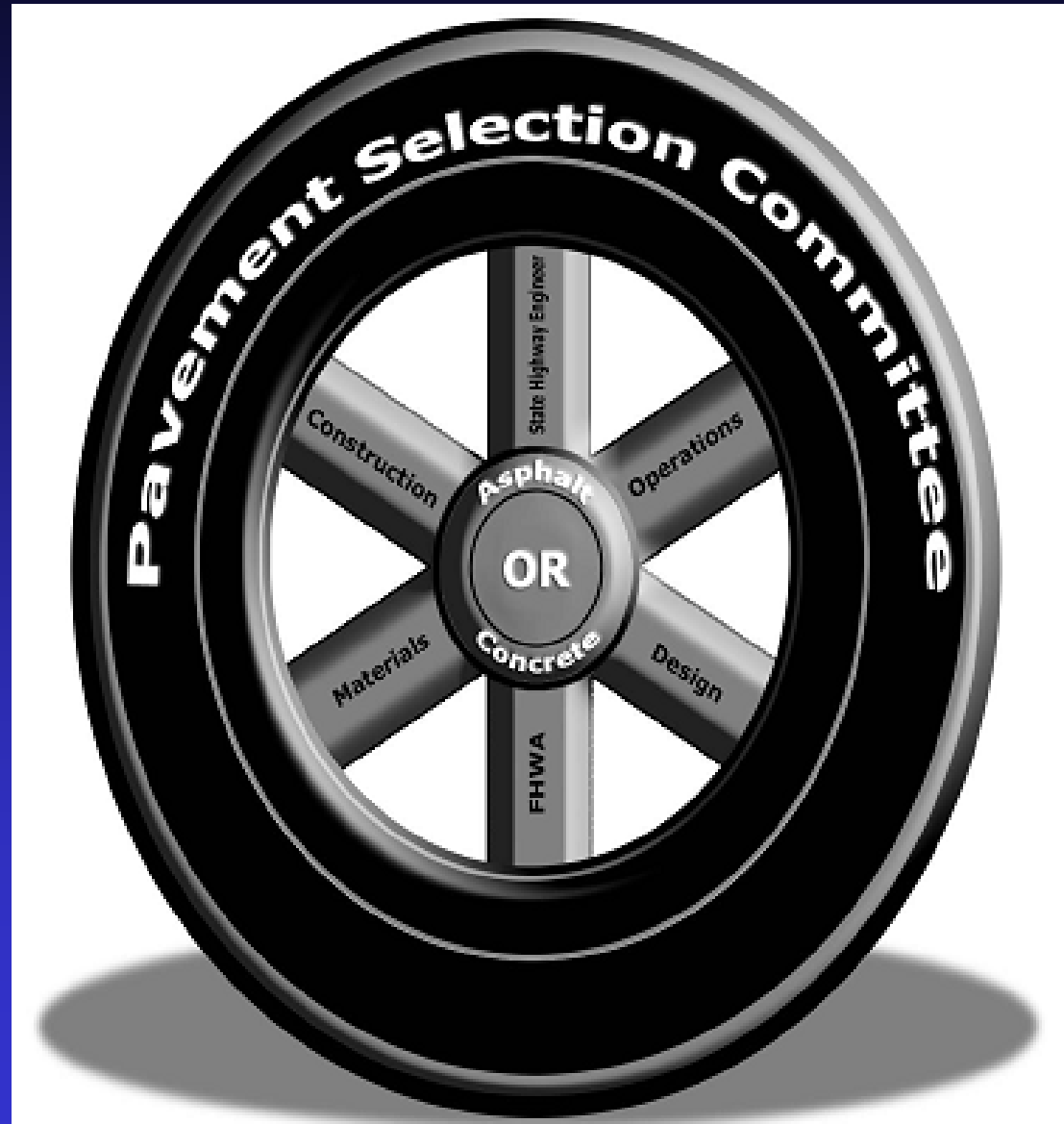
- Form Pavement Selection Committee
- Define Parameters for Life Cycle Cost Analysis
- Define other factors used to determine pavement type

New KYTC Policy

- Signed by State Highway Engineer in October 2003
- Established Pavement Selection Committee
- Adopted roles/procedures for Pavement Committee

Pavement Selection Committee

- Membership
 - State Highway Engineer
 - Director-Division of Highway Design
 - Director-Division of Construction
 - Director-Division of Operations
 - Director-Division of Materials
 - FHWA Representative



Roles of Pavement Selection Committee

- Pavement Type Selection Approval
 - Interstates
 - New Construction, Reconstruction, Major Widening
 - Rehabilitation
 - > 1 1/2" Grade Change, or
 - > 2" Milling
 - Parkways and other NHS Routes
 - New Construction, Reconstruction, Major Widening
 - Rehabilitation
 - > 6" of new pavement based on 20-year Design Life

Roles of Pavement Selection Committee

- Other Projects Off the NHS
 - $\geq 5,000$ ADT (current), or
 - $\geq 5,000,000$ ESALs (20-year), and
 - $\geq 6''$ of new pavement
- Address Other Pavement Issues That May Be Brought Before the Committee

December 9, 2003

A New Administration

A New Direction



Type Selection Revisited

- New Commissioner of Highways wanted ultimate authority for type selection
- Existing Type Selection Policy revised to reflect current administration's philosophy

Approval Process

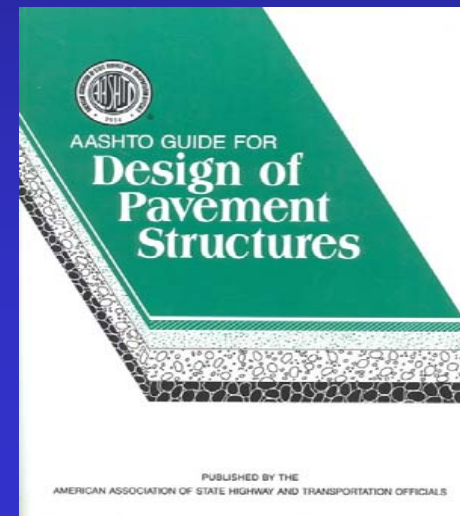
- Project Less Than 5,000,000 ESALs *and* Less Than 1 Mile *and* Off the NHS
 - Pavement Strategy and Type Selection Recommended By Project Team
 - Approval by District TEBM for Pre-Construction

Approval Process

- All Other Projects
 - Pavement Strategy and Type Selection Recommended By Pavement Branch
 - Input from Project Team
 - Approved by Commissioner's Office

Type Selection Factors

Primary and Secondary



Primary Engineering Factors

- Traffic
 - Frequency of Heavy Load Applications
- Soils Characteristics
 - Load Carrying Capacity of a Native Soil
- Weather
 - Pavement Subgrade and Base Materials
 - Pavement Weathering Surfaces and Bound Layers

Primary Engineering Factors

- Construction Considerations
 - Construction Phasing
 - Management of Traffic in the Work Zone
 - Future Phases of Construction
 - Seasonal Considerations
- Cost Comparison
 - Initial Costs
 - Life Cycle Costs

Cost Analysis

- Initial Cost
 - Based on 20-year design life
 - Unit Costs from Engineering Estimator
- Life Cycle Cost
 - Performed when Initial Cost Analysis shows alternates are within 5%

Parameters For Life Cycle Cost Analysis

- Design Life
 - 20 years (Projects Off NHS)
 - 40 years (Interstates, Parkways, Other NHS Routes)
- Analysis Period
 - 40 years
- Rehabilitation Strategies
 - Interstates, Parkways (>15,000 ADT)
 - ASPHALT
 - Years 10,20,30 - Mill 1 1/2” and Resurface 1 1/2”
 - CONCRETE
 - Year 20: Repair 2% area and Diamond Grind
 - Year 30: Repair 4% area and Diamond Grind

Parameters For Life Cycle Cost Analysis

- Rehabilitation Strategies (cont.)
 - All Other Routes
 - ASPHALT
 - Year 15: Mill 1 1/2” and resurface 1 1/2”
 - Year 30: Mill 1 1/2” and resurface 3 1/2”
 - CONCRETE
 - Year 25: Repair 4% area and Diamond Grind
- Agency Costs
 - Initial Cost
 - Rehabilitation Cost

Parameters For Life Cycle Cost Analysis

- User Cost
 - Use FHWA-SA-98-079
 - Analyze separately from Agency Costs
- Salvage Value
 - Not included in Life Cycle Cost Analysis
- Unit Costs
 - Provided by Engineering Estimating Section
- Discount Rate
 - 4%

Secondary Engineering Factors

- Performance of Similar Pavements in the Area
- Adjacent Existing Pavements
- Incorporation of Experimental Features
- Stimulation of Competition

Alternate Pavement Bidding

- Considered when Primary and Secondary Factors are equivalent
- Use an A+C bidding procedure
 - “A” = Materials and Labor
 - “C” = Bid Adjustment Value
- Adjustment based on difference in future agency costs

Future Plans



NCHRP 1-37A

- Implement new AASHTO design procedure
- Plan to initially implement in KY by developing catalog
- Perform parallel designs 2005-2006

Questions?

