

Pavement Deflection, Rolling Wheel Deflectometer, and Pavement Management

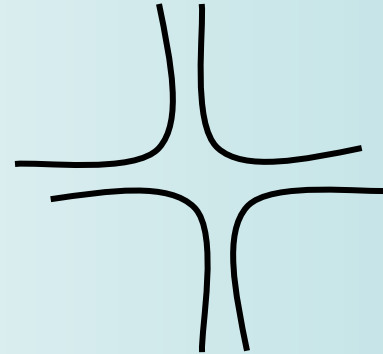
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Today's Discussion

- **Pavement Deflections**
- **Measurements**
- **The RWD Device**
- **Deflection and Pavement Structure**
- **Using Deflection in Pavement Management**



Why Pavement Deflection?

- **Historically Significant**
- **Basis for Layer Elastic Analysis**
 - **Backcalculation**
 - **Mechanistic Pavement Design**
- **Empirically tied to Pavement Performance**

Boussinesq - 1885

Westergaard - 1925

Burmeister - 1943

Odemark - 1949

Schiffman - 1962

Hveem 1935-1962

Chevron -1963

Shell - 1968

Elsym5 - 1970's

WESLEA - 1980's

JULEA - 1990's

**Finite Element Analysis &
Neural Networks - Future**

Measuring Deflection



Benkelman Beam



Dynaflect



Falling Weight Deflectometer



Rolling Wheel Deflectometer

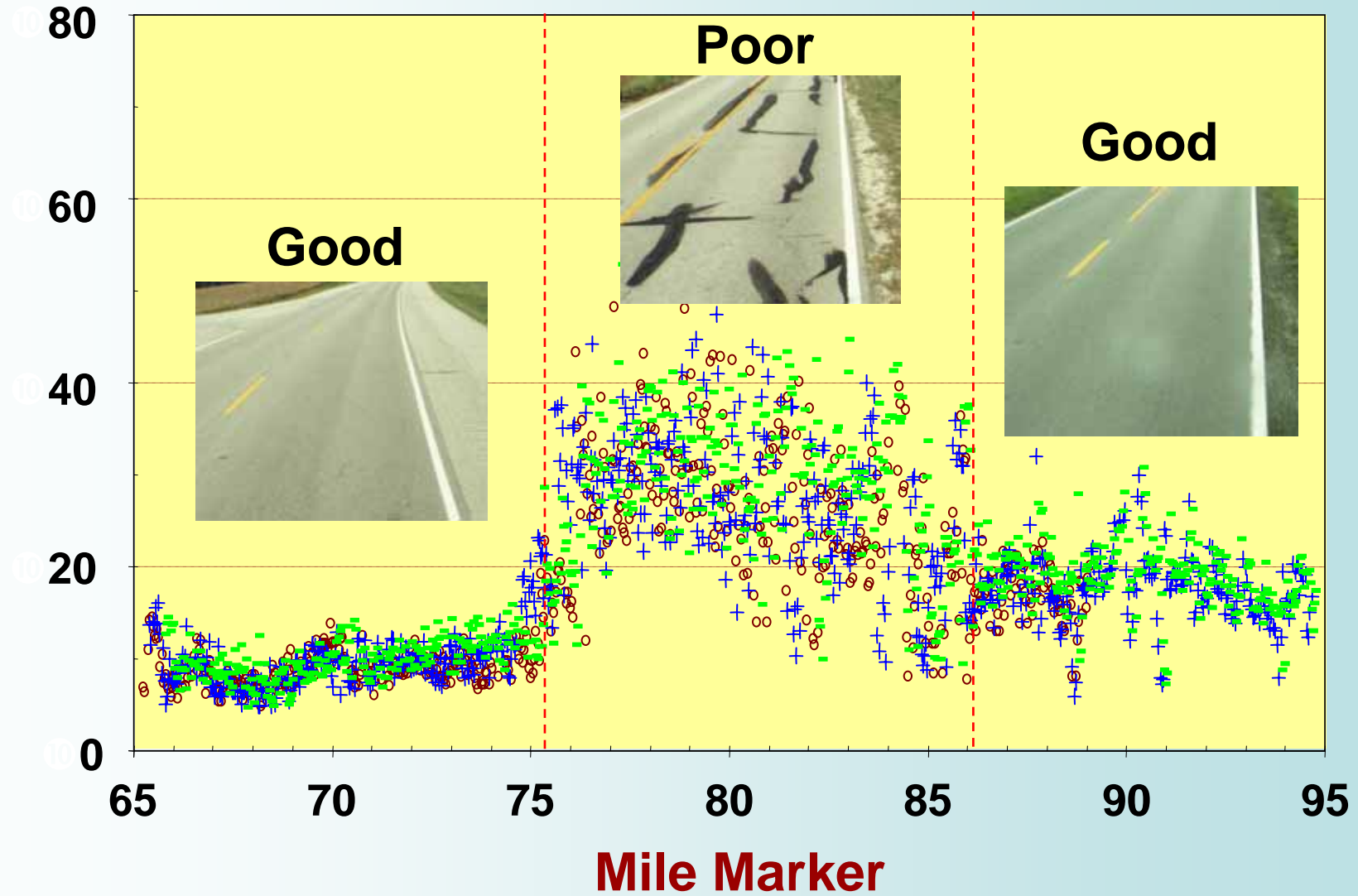


RWD Details

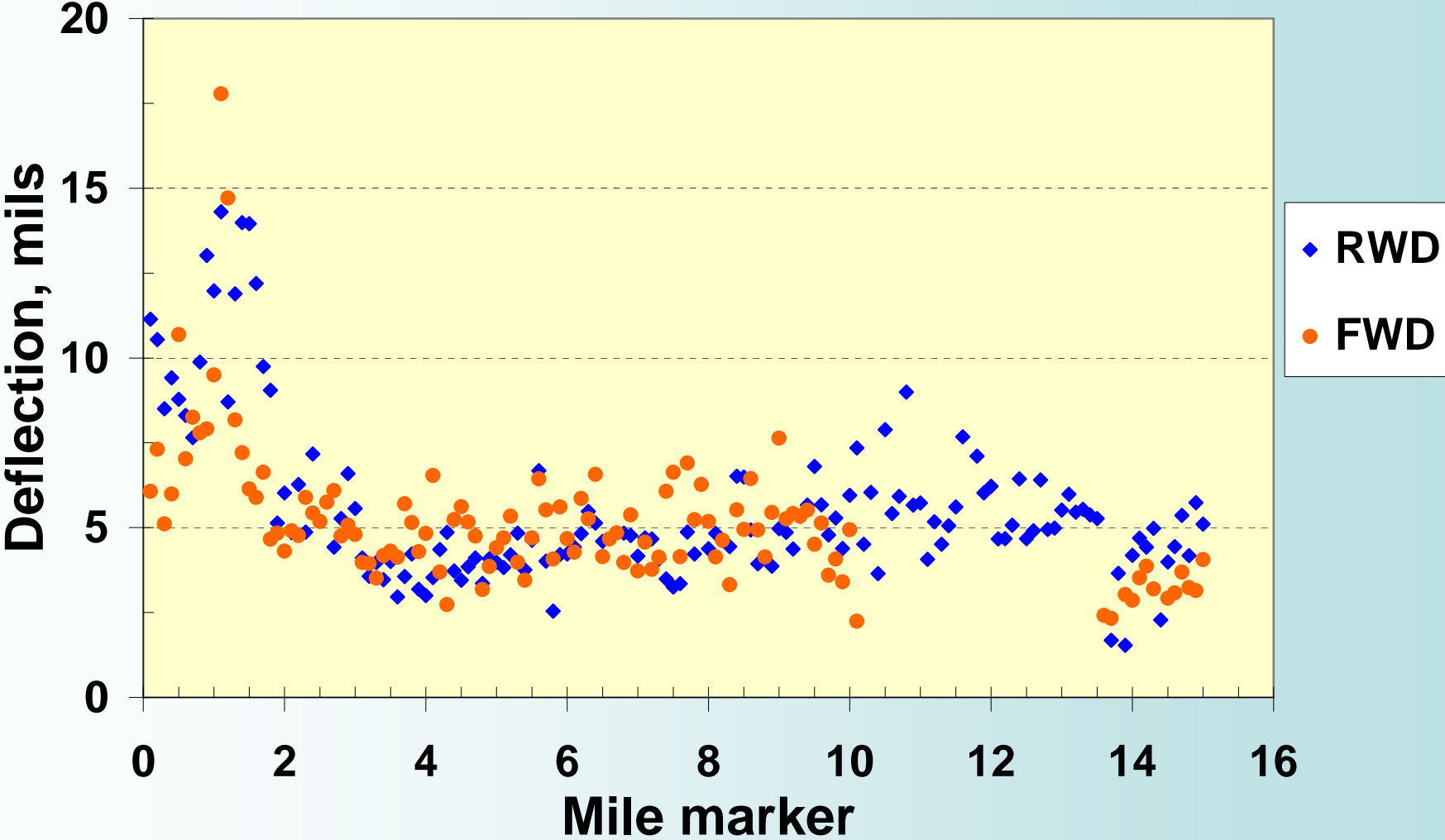


Indiana SR 1 – 3 Structures

Deflection, mils



**OH SR 32 - Pike County.
US 23 to Adams County Line - WB Lane**



Pavement Deflection and Pavement Management

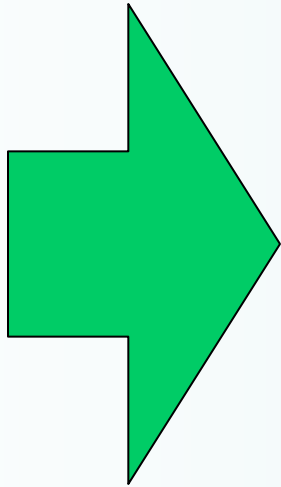
The Basics:

What Decisions are made?

What supports the Decisions?

Does Deflection add to the credibility?

Pavement Management: Current Practice



- 1. Capital Improvement Programs**
- 2. Pavement Preservation Programs**
- 3. Maintenance Programs**
- 4. “Do Nothing”**

Making PMS Decisions

1. What needs to be done?
2. When does it need to be done?

Based on???

Ride Quality
Rutting
Cracking

} Surface Distress

Deflection

Structural?

Pros & Cons for Deflection Measurements

Pro

Trends link to Remaining Service Life
Identifies “soft vs. hard” locations
May link to need for increased maintenance

Con

Dependent on temperature & moisture
Process is largely empirical
Can not link deflections to material properties
Doesn't tell the whole story

Proposal

When will work be needed?

Use IRI, Cracking, and Rutting

What work needs to be done?

Use Deflection measurements

Build into analysis models.

Champaign County, IL Project

Decision Matrix

Deflection 

Representative RWD Deflection, mils

PCI Value	PCI Rating	Representative RWD Deflection, mils			High Traffic Low Traffic Structural Rating
		< 35 < 45 Good	35 - 50 45 - 75 Fair	> 50 > 75 Poor	
100	Excellent	Defer Maintenance			
90	Very Good	Crack sealing			
80	Good	Chip seal, Microsurfacing	Defer Improvements		
65					
	Fair	2-in AC Mill and Overlay		4-in AC Mill and Overlay	
40					
	Poor	4-in AC Mill and Overlay		Reconstruction	
0					

PCI Value 

Conclusions:

- Deflection Measurement is a good thing**
- For Design, you need a basin**
- For PMS, you can do a lot with single points
from RWD or FWD center sensor**

**If you have ideas, questions, or
comments, contact me:**

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