



[www.ara.com](http://www.ara.com)

# Changing Methods in Pavement Data Collection

Northwest Pavement Management  
Association

October 28, 2014



NATIONAL SECURITY



ENERGY & ENVIRONMENT



INFRASTRUCTURE



HEALTH SOLUTIONS

# Presentation Overview

 **Local agency distress desires**

 **Automated distress technology evaluation**

 **Rolling wheel deflectometer**

 **PaVision**

- disrupting local agency PMS data collection

# PMS requires data, tools, & strategies

 **Condition data**

 **Performance models**

 **Treatment matrices**

 **Budgeting & analysis tools**

*"Garbage In,  
Garbage Out"*



# Pavement data collection more than surface distresses

Inventory, Safety, Pavement, Data



Pavement Friction Tester



Marking Retroreflectivity & Color



Falling Weight Deflectometer



Rolling Wheel Deflectometer



Tire-Pavement Noise



# Many rating methods

Pavement Surface Evaluation and Rating (**PASER**)

Pavement Surface Condition Rating (**PSCR**)

LTPP Distress Identification Manual (**DIM**)

Pavement Condition Rating (**PCR**)

Pavement Condition Survey (**PCS**)

Pavement Serviceability Index (**PSI**)

Present Serviceability Rating (**PSR**)

Pavement Condition Index (**PCI**)

Overall Condition Index (**OCI**)

Pavement Distress Rating (**PDR**)

Condition Rating Survey (**CRS**)

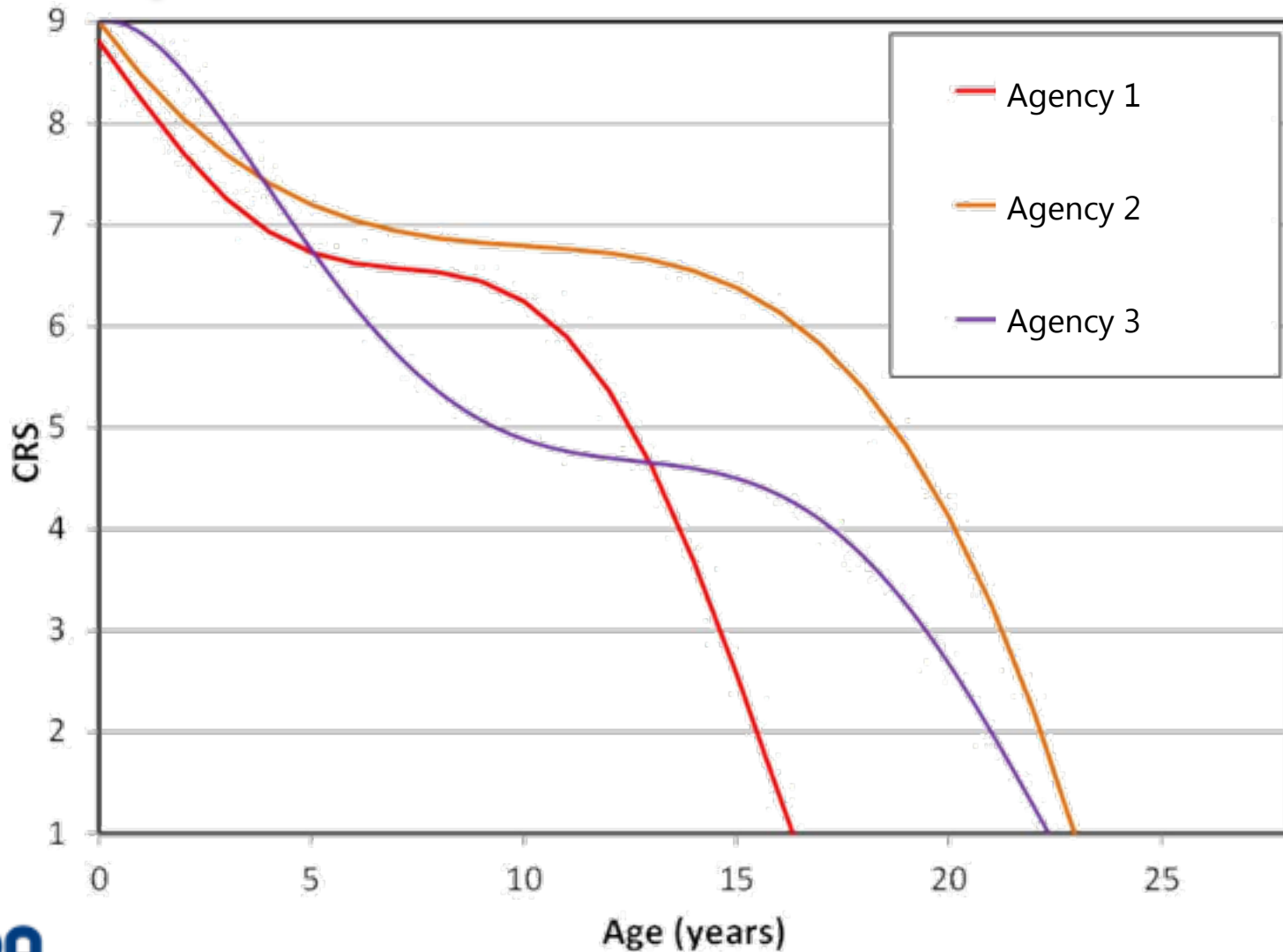
Pavement Quality Index (**PQI**)

Distress Index (**DI**)

# Many rating methods available

	<b>PASER</b>	<b>Condition Rating Survey (CRS)</b>	<b>Modified PCI</b>	<b>Pavement Condition Index</b>
<b>Type</b>	<i>Subjective</i>	<i>Simplified Objective</i>	<i>Simplified Objective</i>	<i>Rigorous Objective</i>
Scale	10 – 1	9 – 0	100 – 0	100 – 0
<b>Consider Smoothness</b>	<i>Subjective</i>	<i>Measured IRI</i>	<b>NO</b> <i>(Supplemental)</i>	<b>NO</b> <i>(Supplemental)</i>
Differentiate Distress Mechanism	NO	YES	YES	YES
<b>Individual Distresses</b>	<i>Subjective</i>	<b>13 Distresses</b> <i>3 – 5 levels</i>	<b>Reduced Distress/</b> <i>Quantity Options</i>	<b>19 Distresses by</b> <i>Severity &amp;</i>
Performance Modeling	Ranking or Worst-First	DOT & other models	Many “typical” models	Many “typical” models
<b>Cost to collect</b>	<b>\$</b>	<b>\$\$</b>	<b>\$\$\$</b>	<b>\$\$\$\$</b>

# Same rating system, same region, same contractors, different performance



# Other factors impact rating method

⦿ Regional / State requirements

⦿ PMS software limitations

⦿ Local preference

⦿ Available performance models

⦿ Data collection method

⦿ Cost





# Federal rulemaking future impact

## Initial Rulemaking focused on

- Interstate System
- National Highway System

## Rule for condition of pavement

## Rule for performance of system

## Data elements to standardize data

## MPO to coordinate and be consistent

# Choose your rating method to meet your needs

 **Recognize requirements**

 **Understand best practices**

 **Look to coordinate**

 **Protect your pavement investment**

# Automated Distress Evaluation

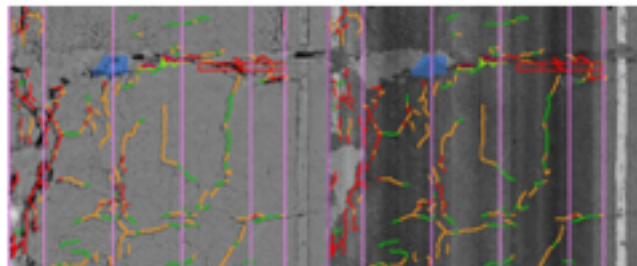


PCR Evaluation –  
Considering Transition from Manual to  
Semi-Automated Pavement Distress Collection and Analysis

**William Vavrik, Ph.D., P.E.**  
**Lynn Evans**  
**Joseph Stefanski, P.E.**  
Applied Research Associates, Inc.

and

**Shad Sargand, Ph.D.**  
Ohio University



for the  
Ohio Department of Transportation  
Office of Statewide Planning & Research

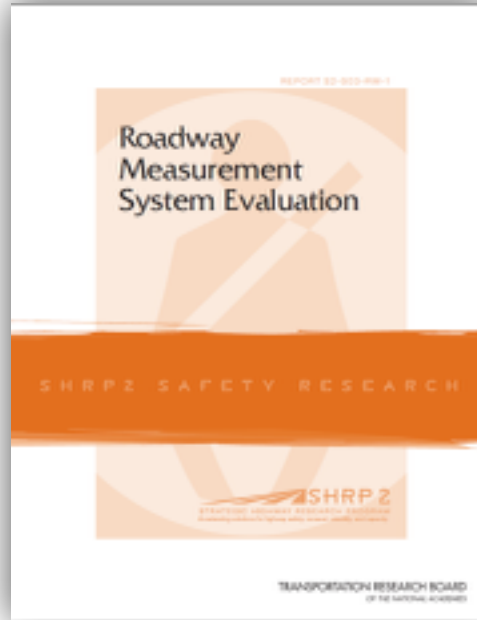
State Job Number 134668

July 2013

*Final Report*



# Success in Similar Projects



# Ohio DOT study requirements

## High quality data required

- Performance metrics driven decisions at ODOT

## Long history with PCR data

## Desire to reduce cost and retain quality

## Desire for using data in Pavement ME calibration

# Technology is rapidly evolving

## Improvements to

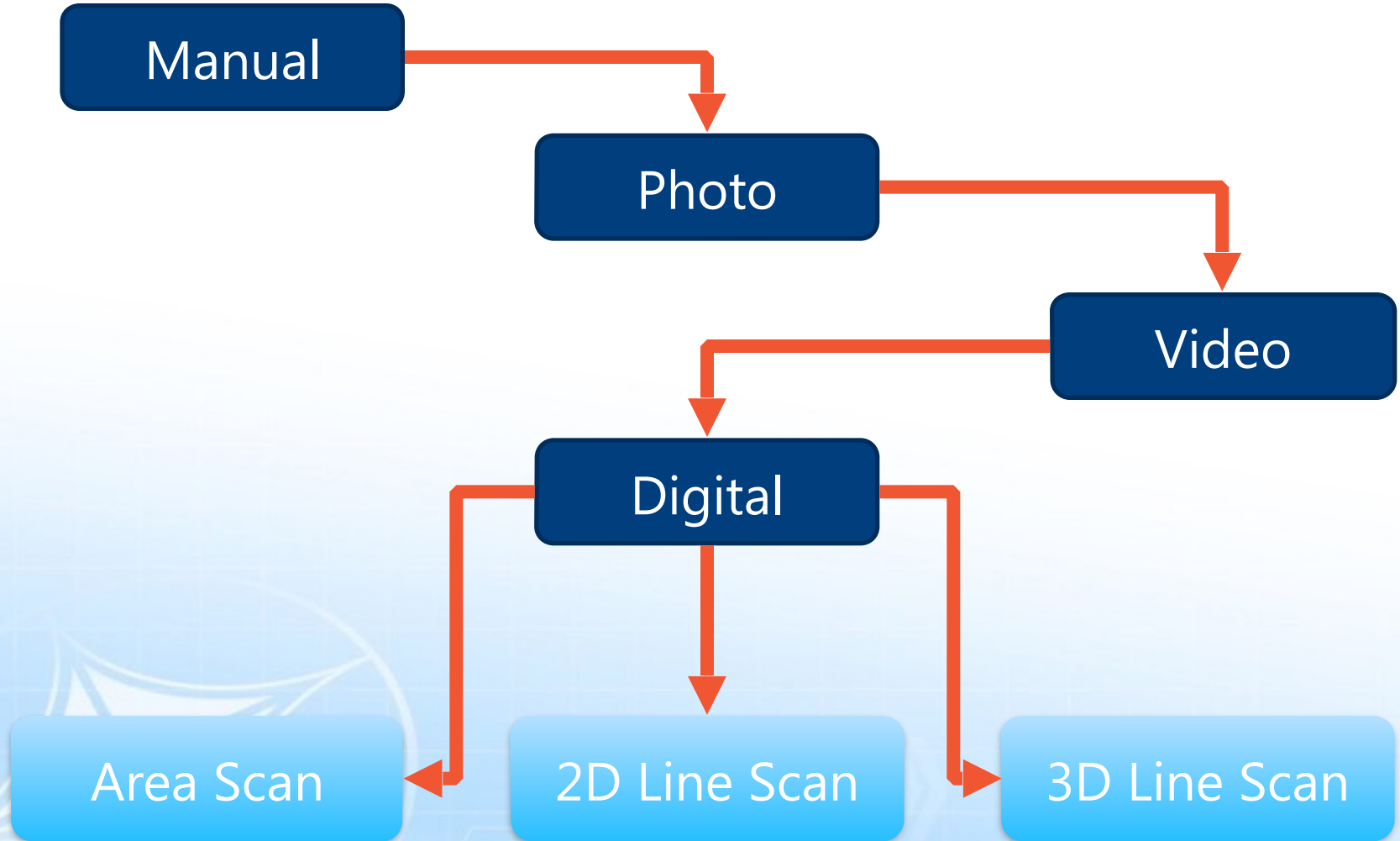
- Automated data collection
- Semi-automated distress analysis

## Measuring at higher precision & accuracy

## 2D and 3D imaging

## High sample frequency profile measurements

# Technology has/is evolving





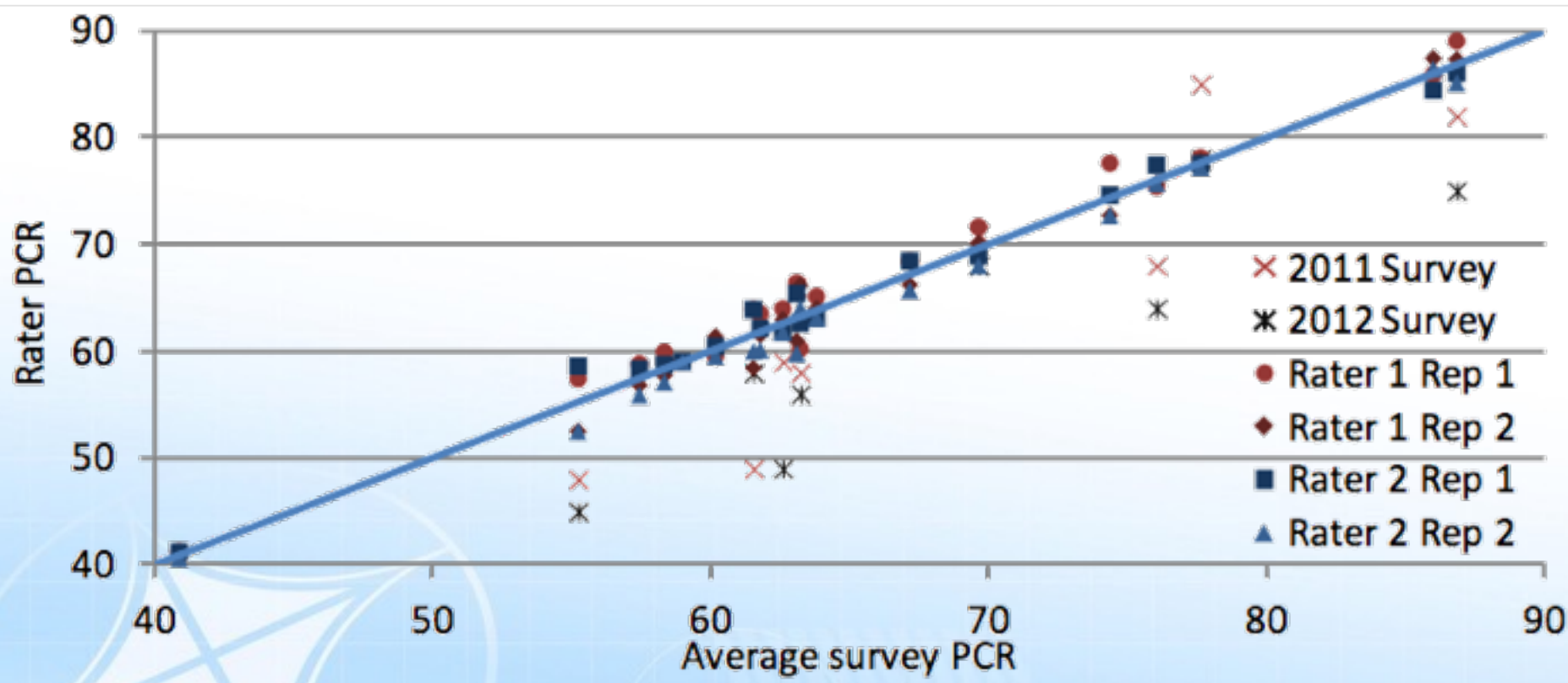
# Evaluated major state vendors



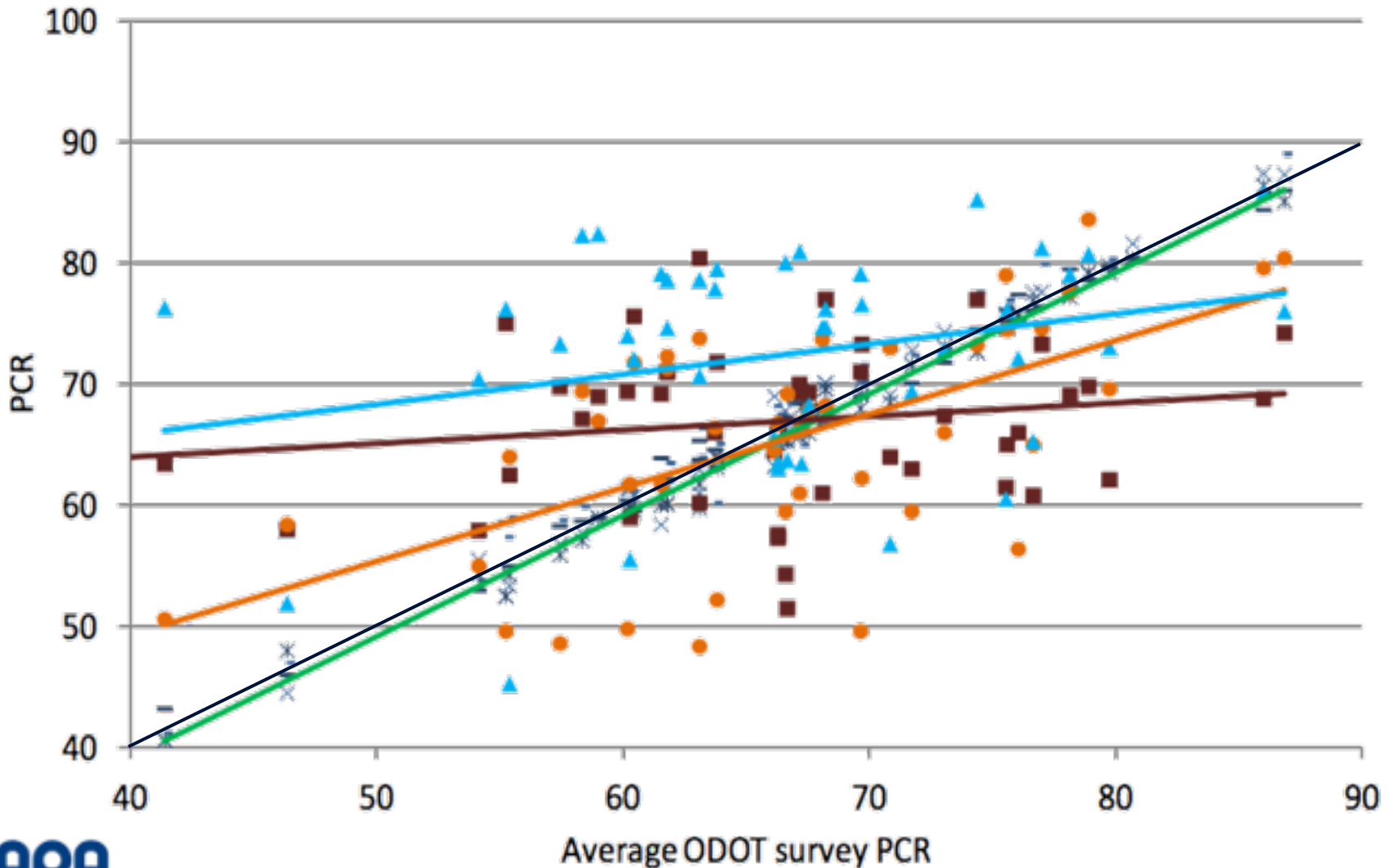
# Looked at ROW imaging



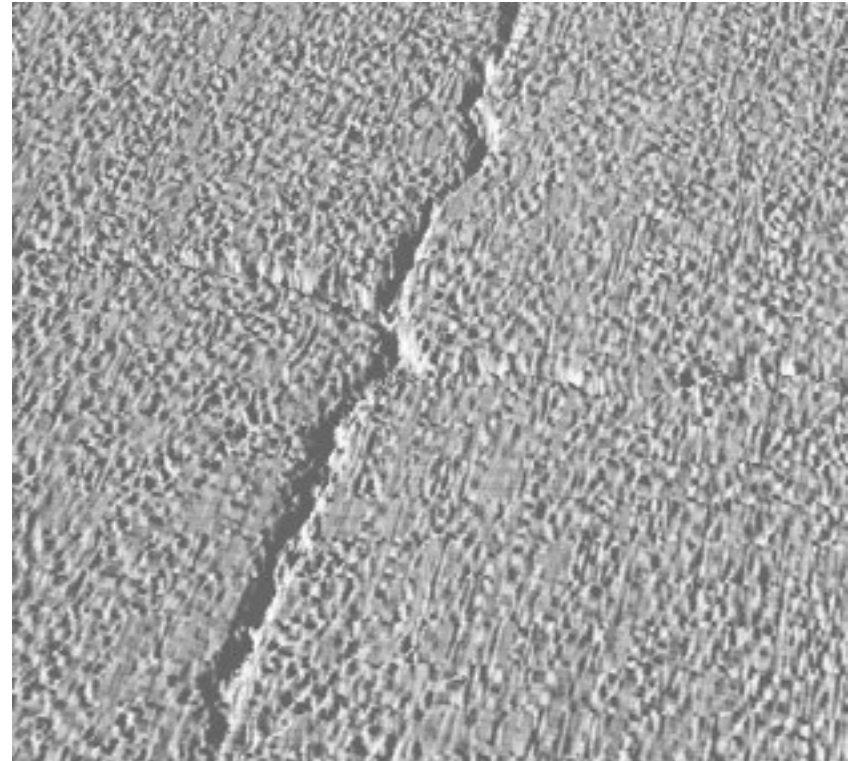
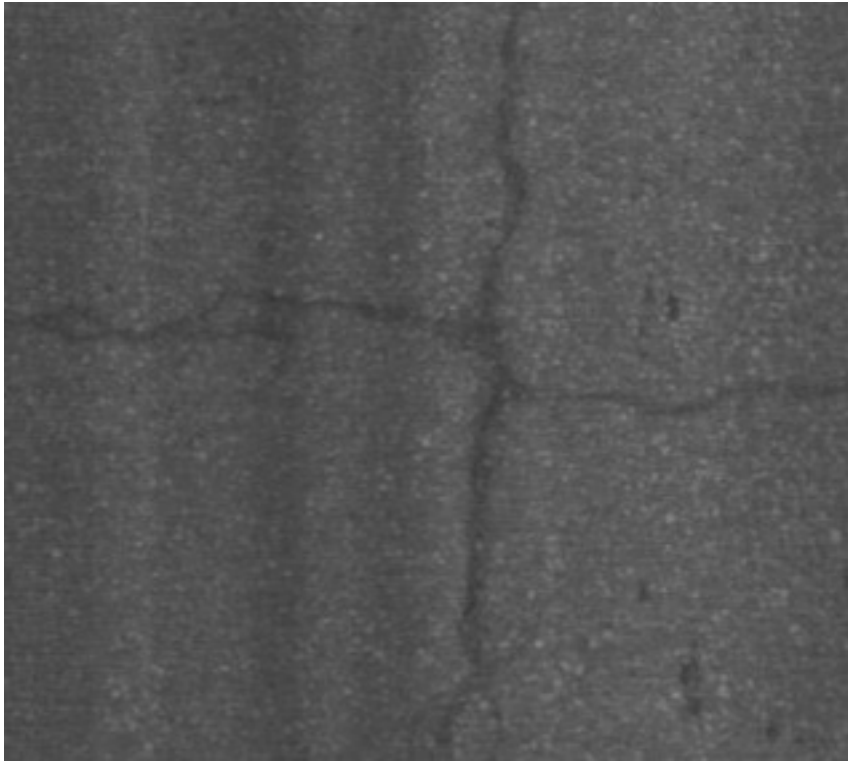
# Manual process is reasonable



# Automated not at same level



# Imaging is impressive



# Cost is a primary concern

 Manual data collection generally lowest cost

 Cost to change is high

<b>Selected criteria</b>	<b>2013 Agree (%)</b>	<b>2009 Agree</b>
<i>Cost-effectiveness</i>	<b>75</b>	<b>69</b>
<i>Scope of data collection</i>	<b>63</b>	<b>44</b>
<i>Availability of qualified contractor</i>	<b>31</b>	<b>29</b>
<i>Experience of other agencies with</i>	<b>19</b>	<b>58</b>
<i>Safety of agency raters</i>	<b>50</b>	<b>33</b>

# **Semi-automated does well in some areas still work to be done in others**

 **Quality high for some pavement distresses**

 **Trouble with some distresses**

 **Some are not feasible today**

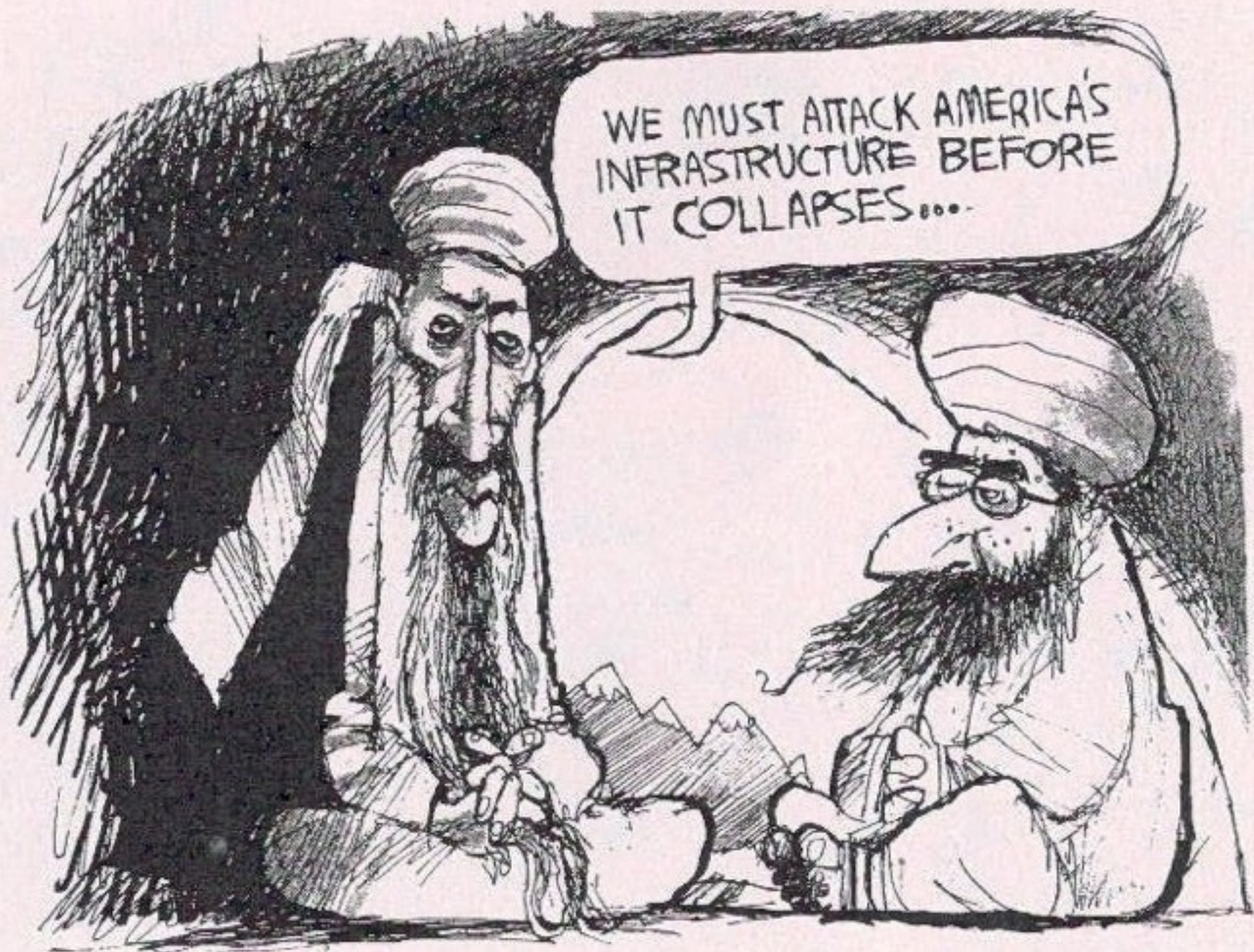
# Automated benefits

- ⦿ **Safety**
- ⦿ **Data accuracy**
- ⦿ **Timeliness**
- ⦿ **Historical data**
- ⦿ **Moves toward standardization**
- ⦿ **Use of data for project-level reviews**
- ⦿ **Consistent**



# Rolling Wheel Deflectometer





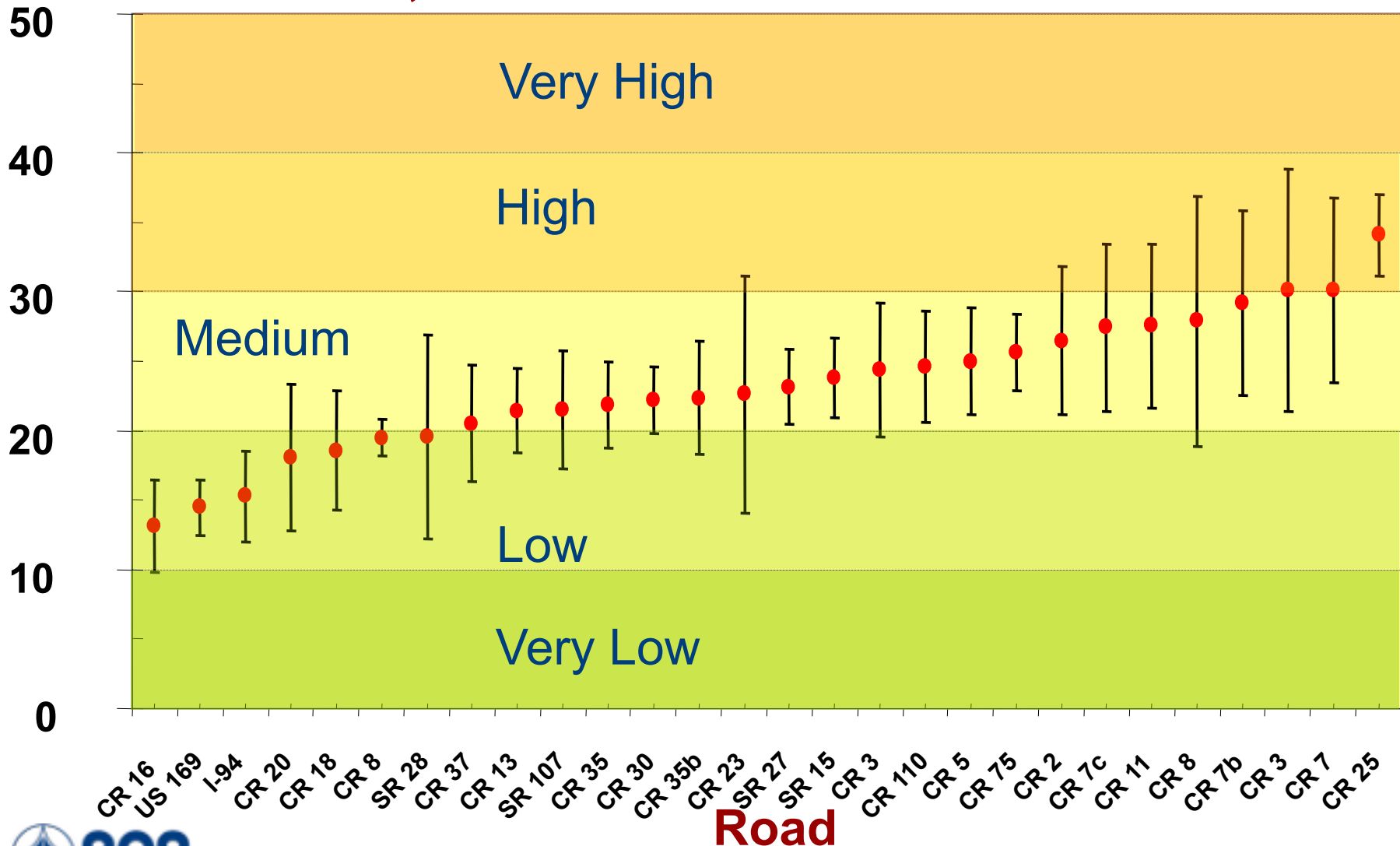
# Rolling Wheel Deflectometer

- ◆ Deflection measurement at highway speed
- ◆ Structural capacity
- ◆ Network-level management
- ◆ Deflection-based overlay design



# MN County Highways - Statistics

Deflection, mils



Road

# Decision Matrix – Put the system to work

		SURFACE AND STRUCTURAL CONDITION			TRADITIONAL
PCI Value	PCI Rating	Representative RWD Deflection, mils			<i>Surface Condition Only</i>
		< 35 Good	35 - 50 Fair	> 50 Poor	
100	Very Good	Defer Maintenance			Defer Maintenance
80		PM - Crack sealing (max. 1 time)			Distress Repair
60	Good	Microsurfacing (max. 1 time)	Cape Seal (max. 2 times)	Distress Repair (max. 1 time)	Surface Treatment (Preventive Maint.)
		<i>FEASIBILITY</i>			
40	Fair	Mill & Thin ACOL	Mill & Thin ACOL w/ FD Repairs	Mill & Thick ACOL w/ FD Repairs	Minor Resurfacing
20		Mill & Thin ACOL w/ PD Repairs	Mill & Thick ACOL w/ PD Repairs		
0	Failed	RECONSTRUCTION			RECONSTRUCTION

Structural Data allows you to choose the *right* project at the *right* time!

# PaVision

.....>

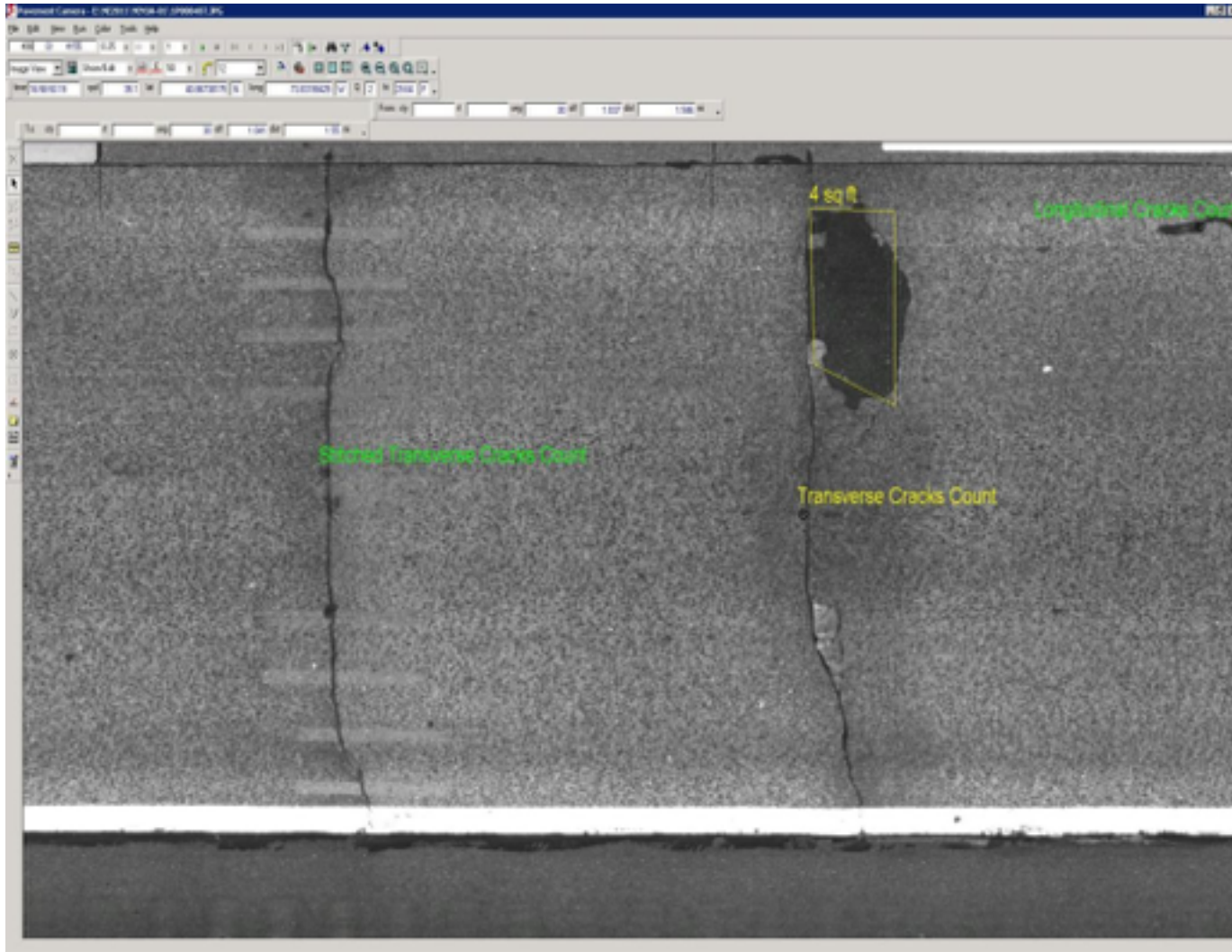
disrupting local agency PMS data  
collection



# Current equipment expensive



# Data quality high and getting better





# PaVision

## ⊕ PaVision is low cost, high quality data collection system

- Low cost, easy to install in use, highly mobile

## ⊕ Allows agencies to collect & analyze pavement distress

- Cracking & surface distresses
- Roughness

## ⊕ Reports pavement condition index, roughness, and distress

- Data analysis is fully automated
- Data ready for import to MicroPAVER & other systems



A Disruptive Innovation in Pavement Data Collection

# PaVision simplifies PMS data collection

## ◆ PaVision Data Collection

- Hitch-mounted camera & sensor system
- Magnet-mounted GPS & sensor system
- Laptop computer with attached storage drive
- Data collection Software

## ◆ PaVision Analysis (cloud-based system)

- Identifies pavement distresses in images
- Determines pavement roughness from sensors
- Assigns pavement distress & roughness to route location
- Aggregates pavement distress & roughness
- Reports pavement distress index, roughness, and details



# PaVision to launch in early 2015



# Thank You!

