Applying the Latest Technology to Optimize Pavement Assessment

SEPMS 2018

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"Forest for the Trees"

Three Objectives:

1. Review challenges/pitfalls of traditional assessments
2. Share changes in technology (making more comprehensive assessments now possible)
3. Review case studies and potential implications

Perspective

Pavement Assessment...

– The "Old Fashioned" Way

Continuous vs. Sampled

Pavement Assessment historically "Sample" based

Pavement conditions, vary along roadways
- Ride
- Density (Intelligent Compaction, Infrared, GPR)
- Segregation (Texture)
- Structural Integrity (TSD, GPR)
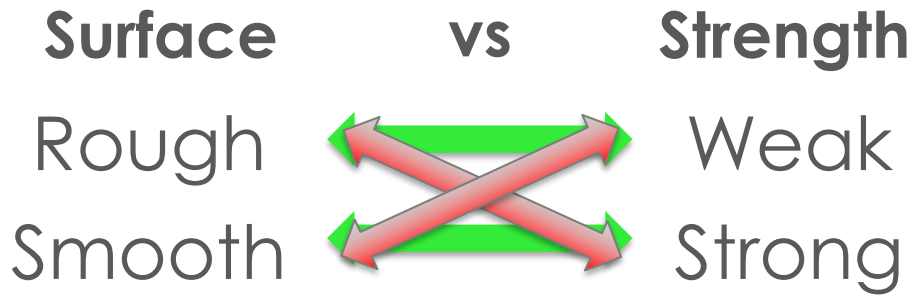
Surface Condition vs. Remaining Life

Historically
Design by strength characteristics
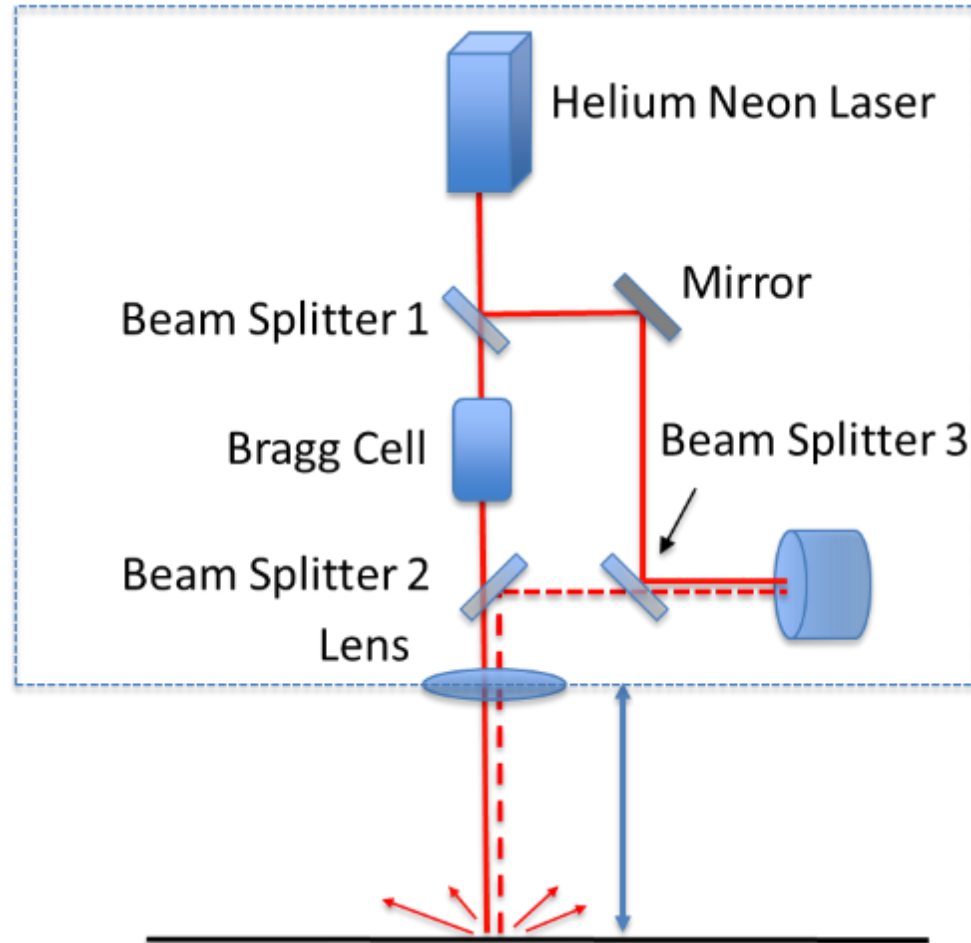Manage by surface characteristics

Surface   **vs**   **Strength**

Rough   Weak

Smooth   Strong

BUT inverse can also be true

Hint: finding out may save you $$$

Traditional Strength Measurement

Structural Assessment - Evolved

How? – Doppler Lasers

Continuous Deflection Measurement
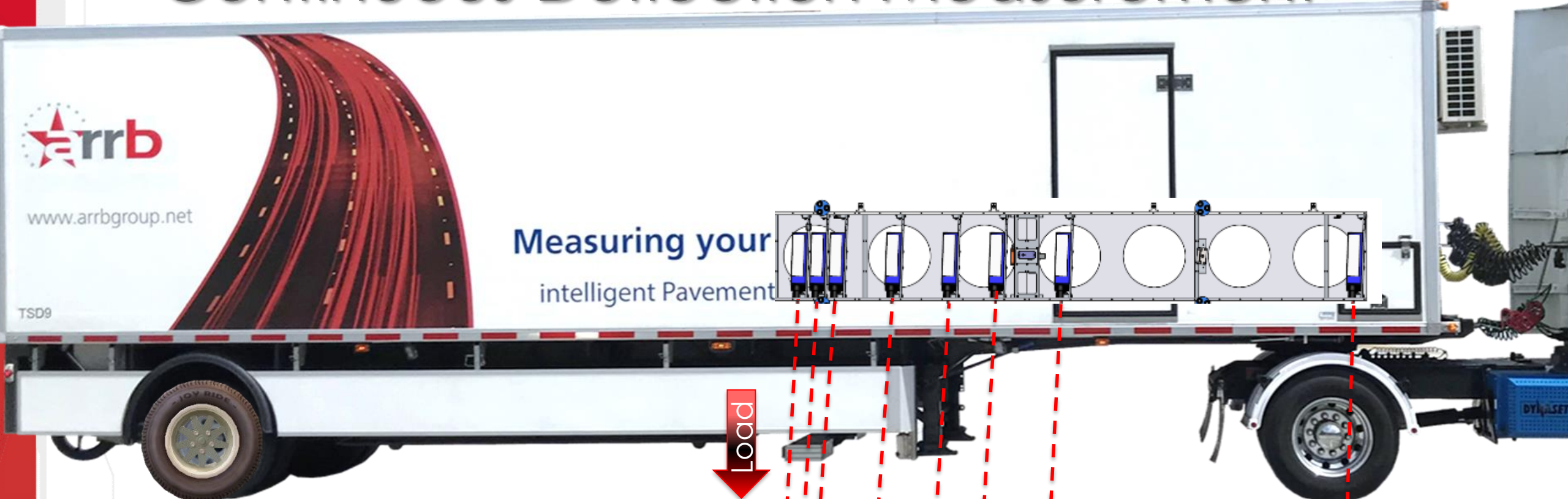
Deflection Slope = V_V/V_H

V_H

V_V

*not to scale

Load

intelligent Pavement Assessment Vehicle

Pavement response under load
- Velocity of deflecting road surface → via **Doppler lasers** positioned ahead of loaded rear wheel

Road surface characteristics
- Wheel-path roughness & texture → via **Point lasers**
- Rutting & cracking → via **Automatic Crack Detection**
- Calibrated Imaging → via **Digital HD cameras**
- Positioning → via **Gipsi-Trac inertial & RTK-GPS**

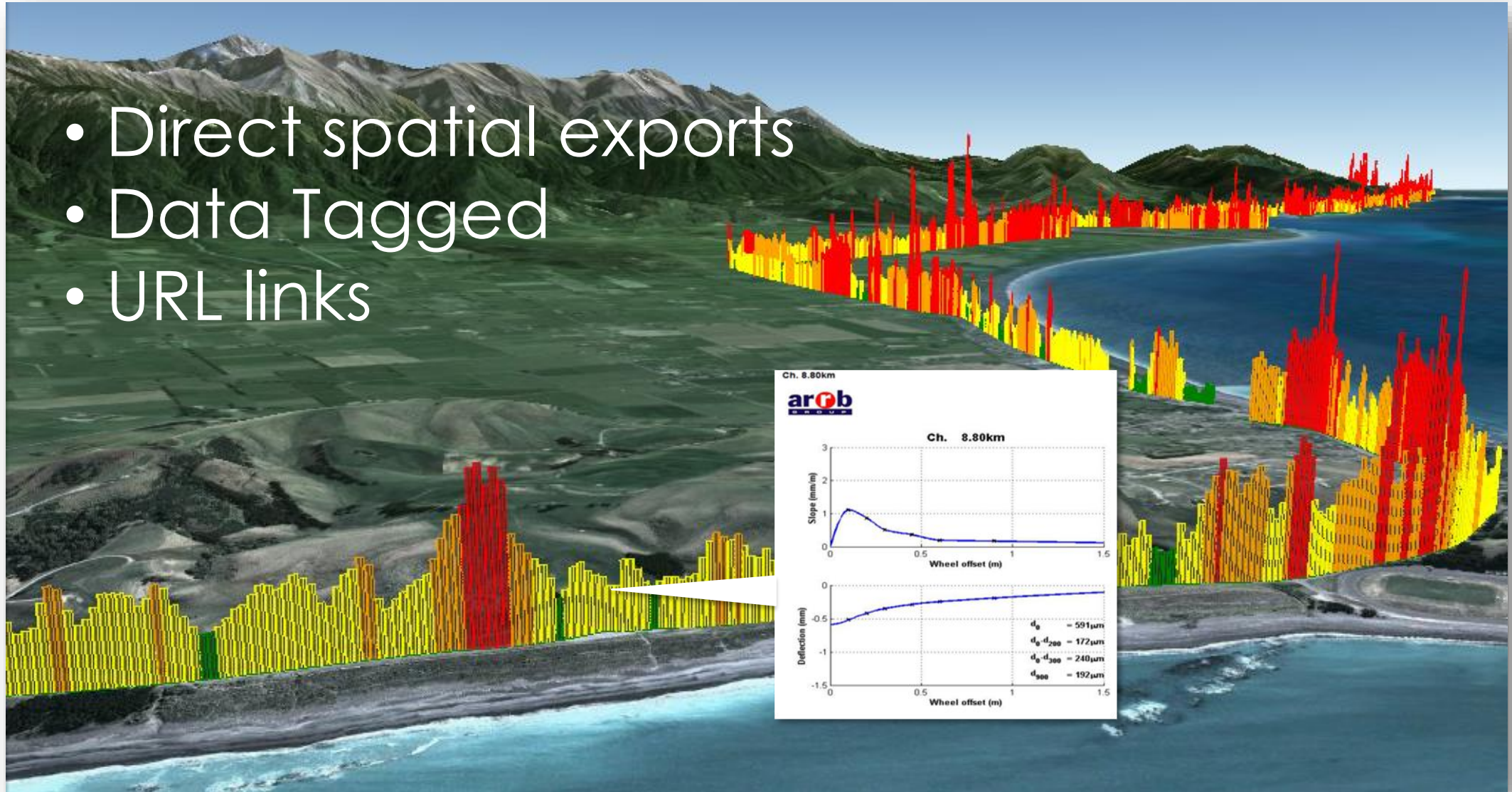# Network level data, project level detail

- Pavement Conditions Vary
  - Continuous properties needed
- Averages over network level segments
  - Lose something in the summation
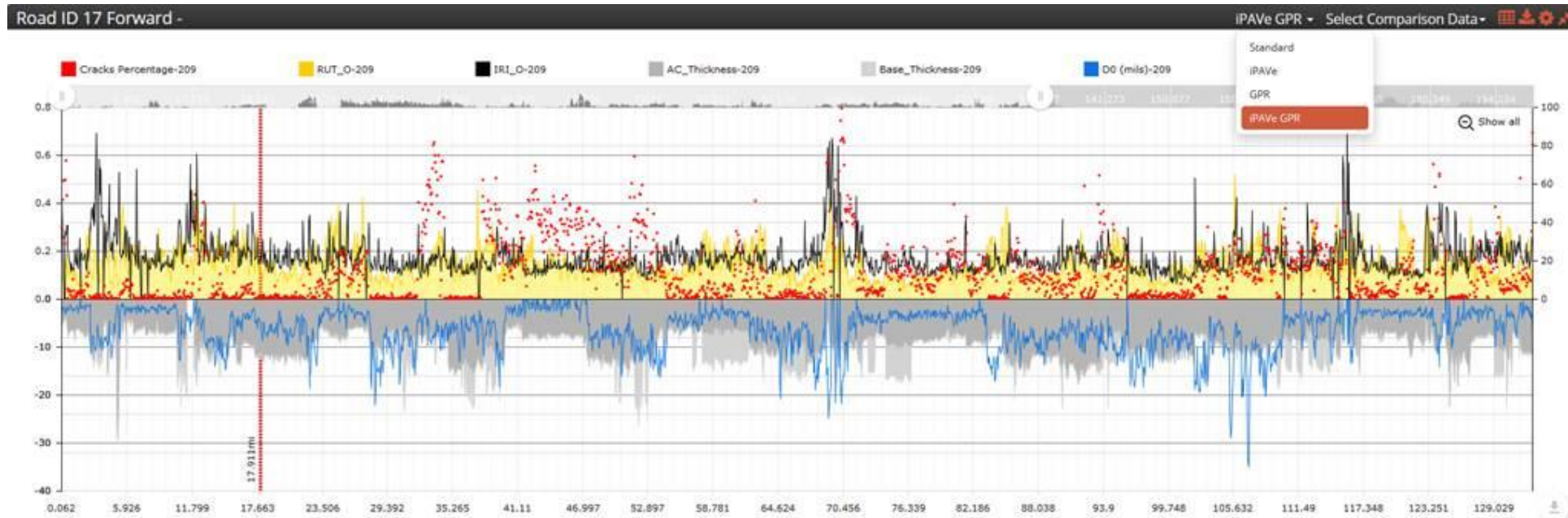
Spatial Data Representation

- Direct spatial exports
- Data Tagged
- URL links

All data in one place...for all time

Summer 2017 - Road ID: Loop_01 Eagle Bay Loop Forward 4.672mi L0 [Rear Right]
Lat/Lon: 40.10584, -75.66867

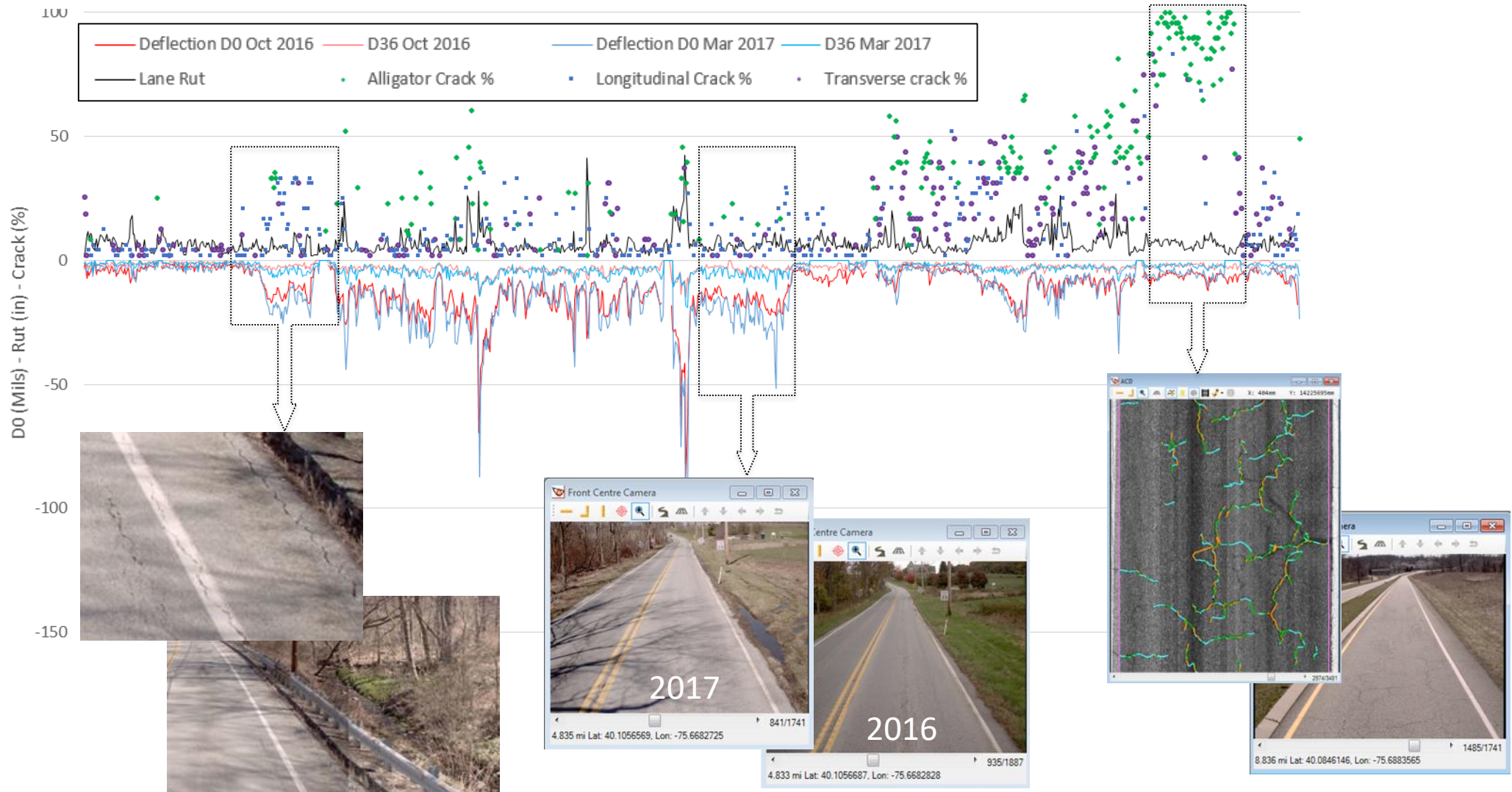Collected: 22 Jun. 2017   hawkeye:::306763863188352:4.665976791212947
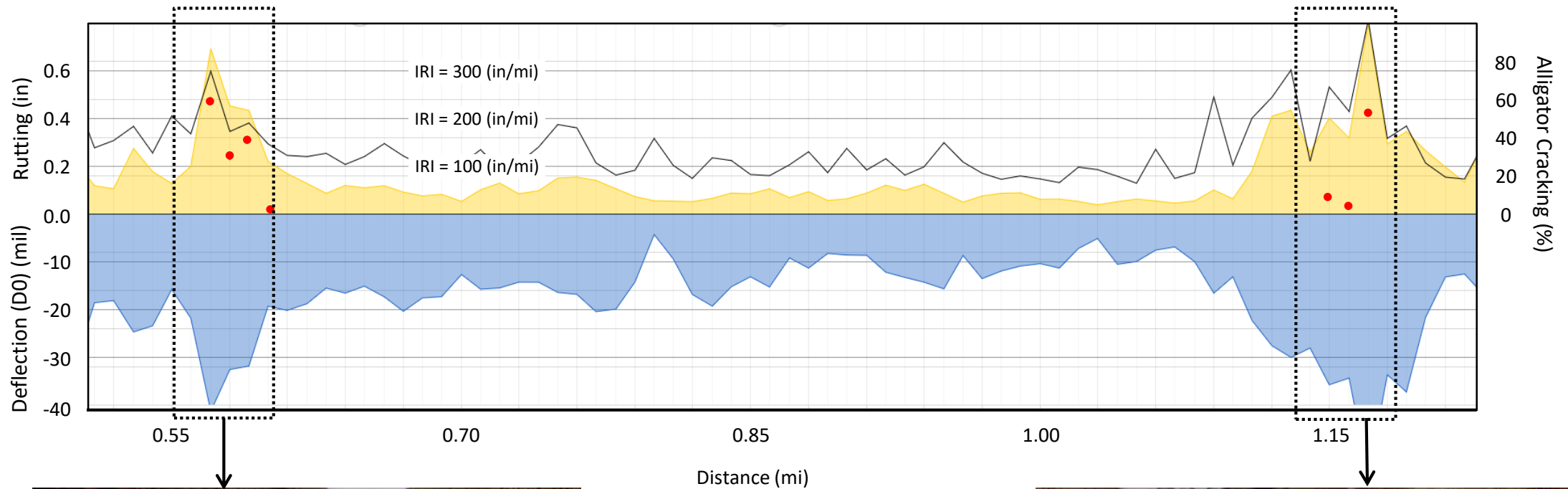
Collected: 13 Feb. 2018   hawkeye:::479387400929840:4.671902123635498

Summer   Winter
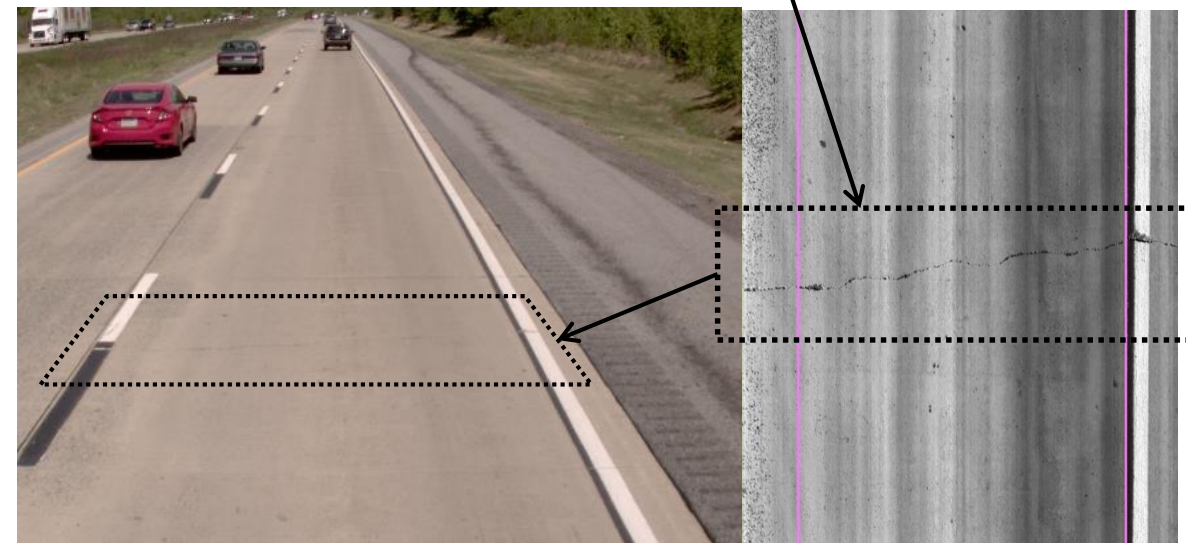
Effectively Using the Tools Available

Case Study #1 West Virginia

Case Study #2a Delaware

Case Study #2b Kansas

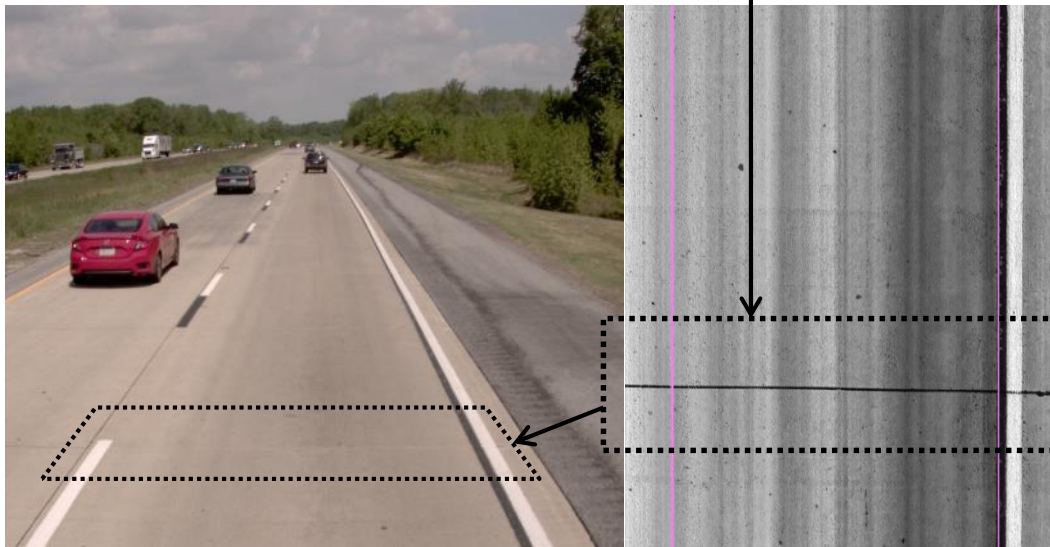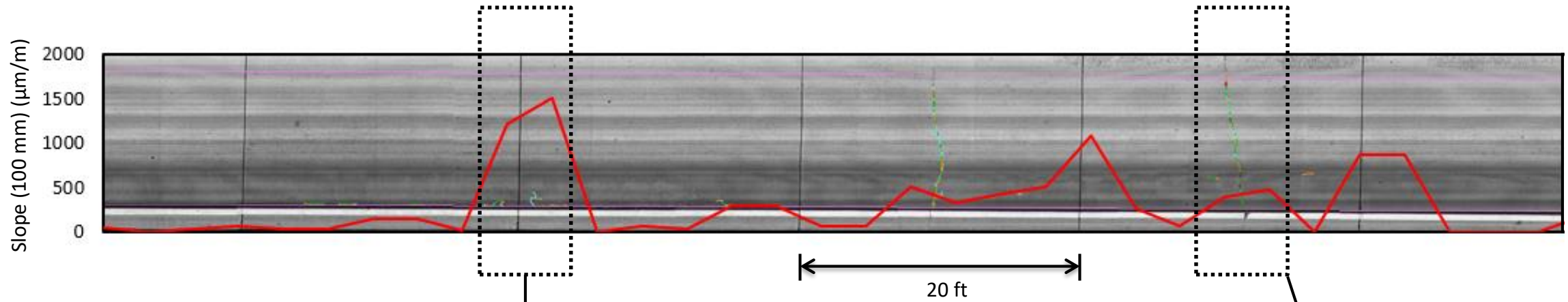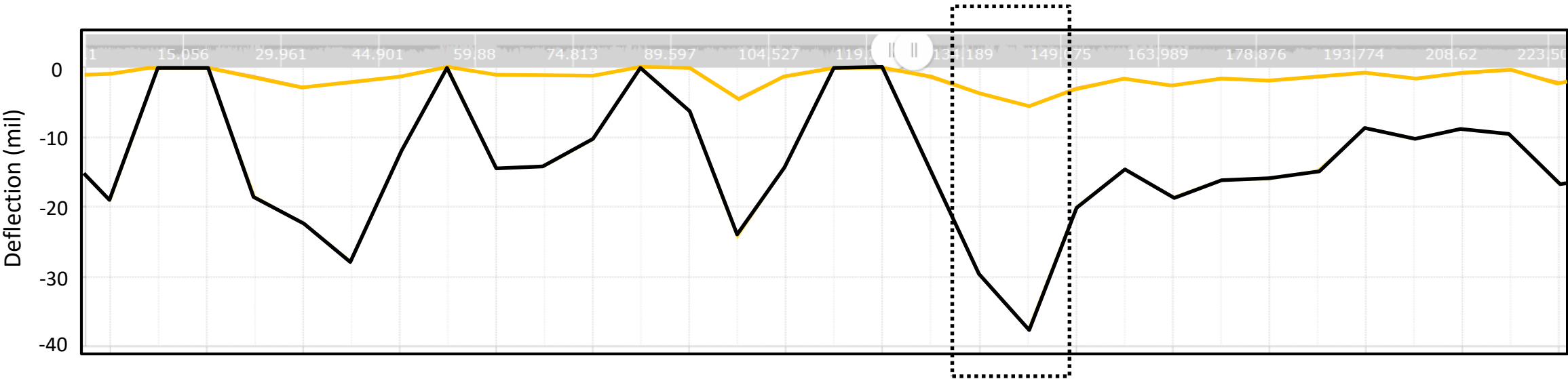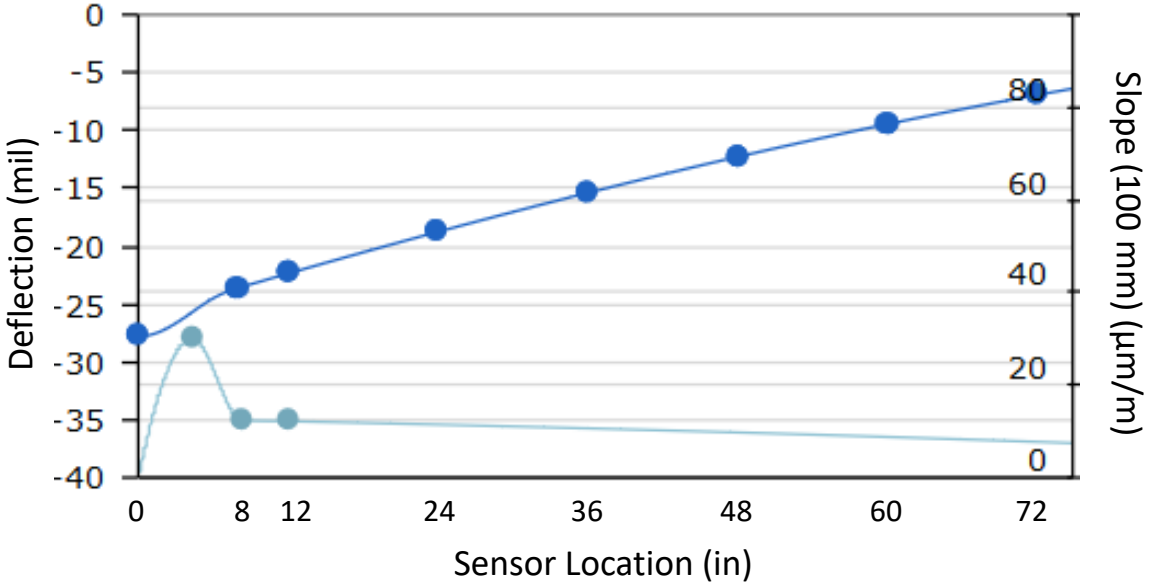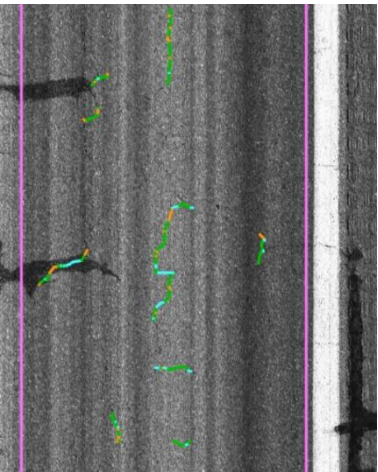Maximum Deflection (D0) (mil)
SCI Subgrade (D60 – D36) (mil)

Case Study #3 Kansas
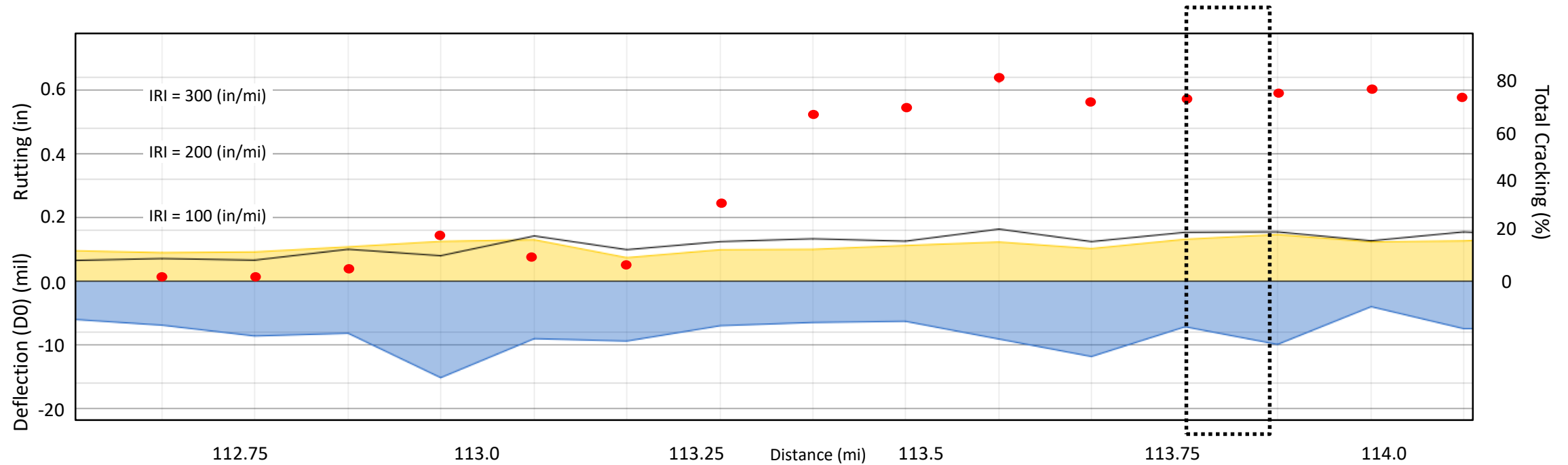
Legend:
- Deflection (D0) (mil)
- IRI Right (in/mi)
- Rut Right (in)
- Total Cracking (%)
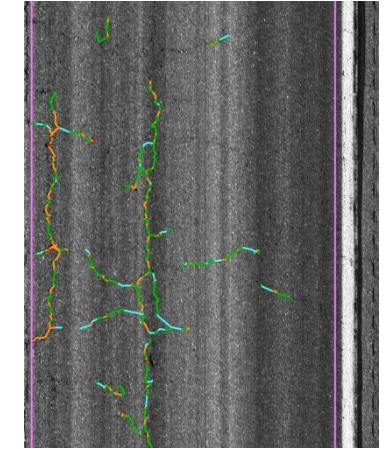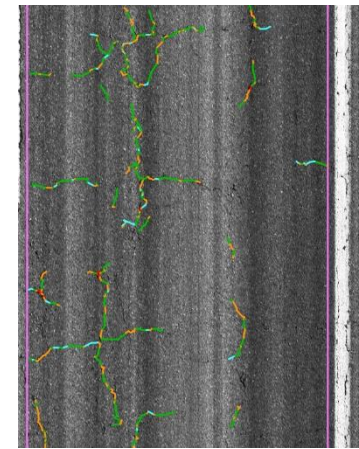
Net Result

Collecting Structural Capacity data as part of an overall assessment provides:
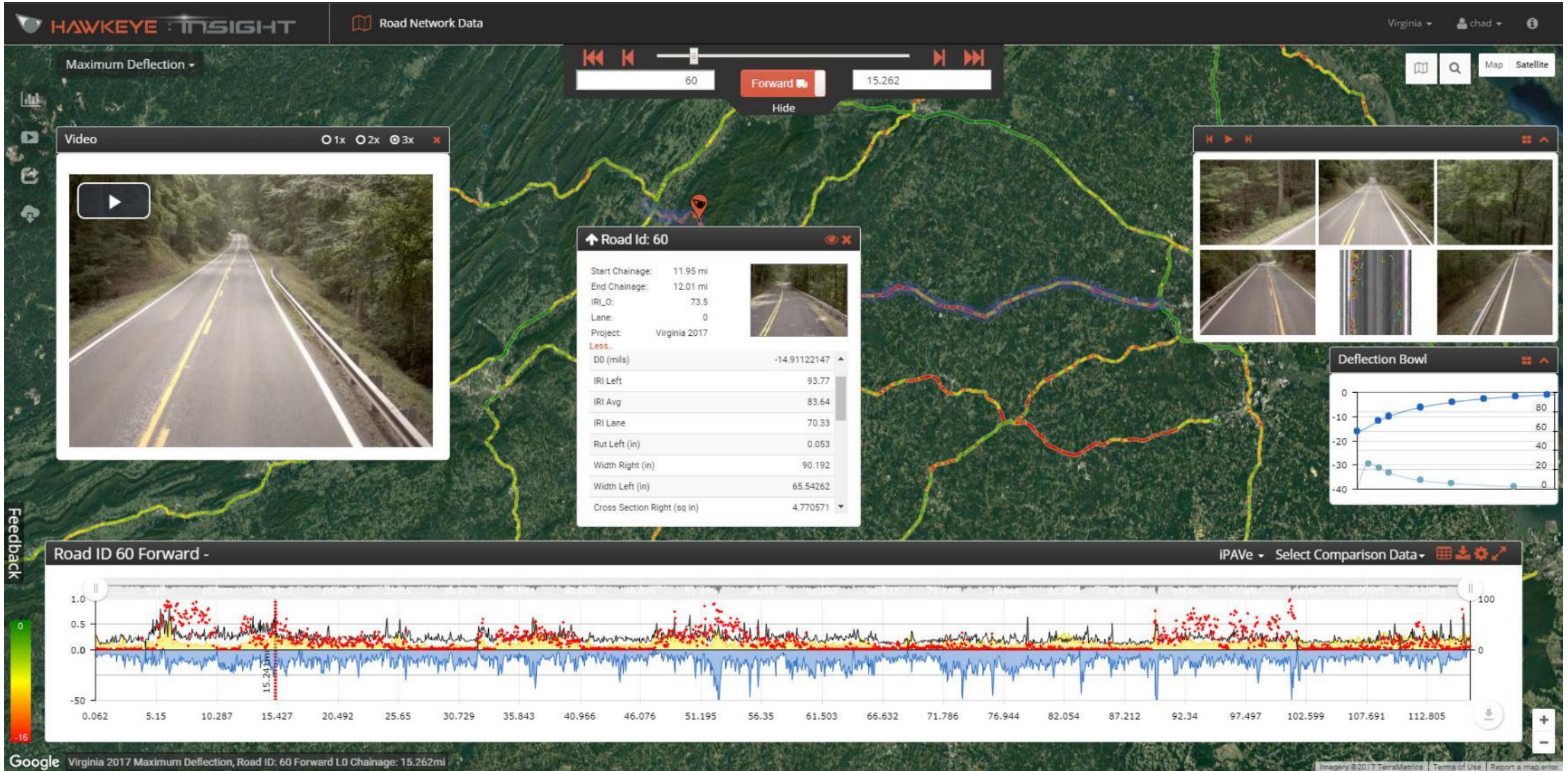
- ✓ Better understanding of overall pavement condition
- ✓ Less traffic disruption
- ✓ Opportunity for better project and treatment selection

Comprehensive Assessment

https://www.pooledfund.org/Details/Study/637

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Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs)

General Information

Study Number: TPF-5(385) View Commitment Details   **Status:** Cleared by FHWA   **Contract/Other Number:**

Lead Agency: Virginia Department of Transportation   **Last Updated:** Aug 9, 2018

Contract Start Date: **Est. Completion Date:**   **Contract End Date:**

Solicitation Number: 1478

Partners: Louisiana Transportation Research Center , ID , IN , LA , PA , VA , VT

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Comprehensive Assessment Opportunities

Network Level Evaluations

- **?** Which roads should be tested?
- **?** How should the results be incorporated in existing management systems?
- **?** How frequently should testing be conducted?

Project Level Evaluations

- **?** Is "Back Calculation still needed?
- **?** How should data be applied to mechanistic design?
- **?** Are we making optimal use of deflection velocities?

Questions

? How can network level pavement evaluation better support "project level" decisions?

? What are the perceived limitations and/or potential approaches for mitigation?

? What additional applications for these new tools merit consideration?

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