



# Theme summary Structural sessions

Brian Ferne, TRL

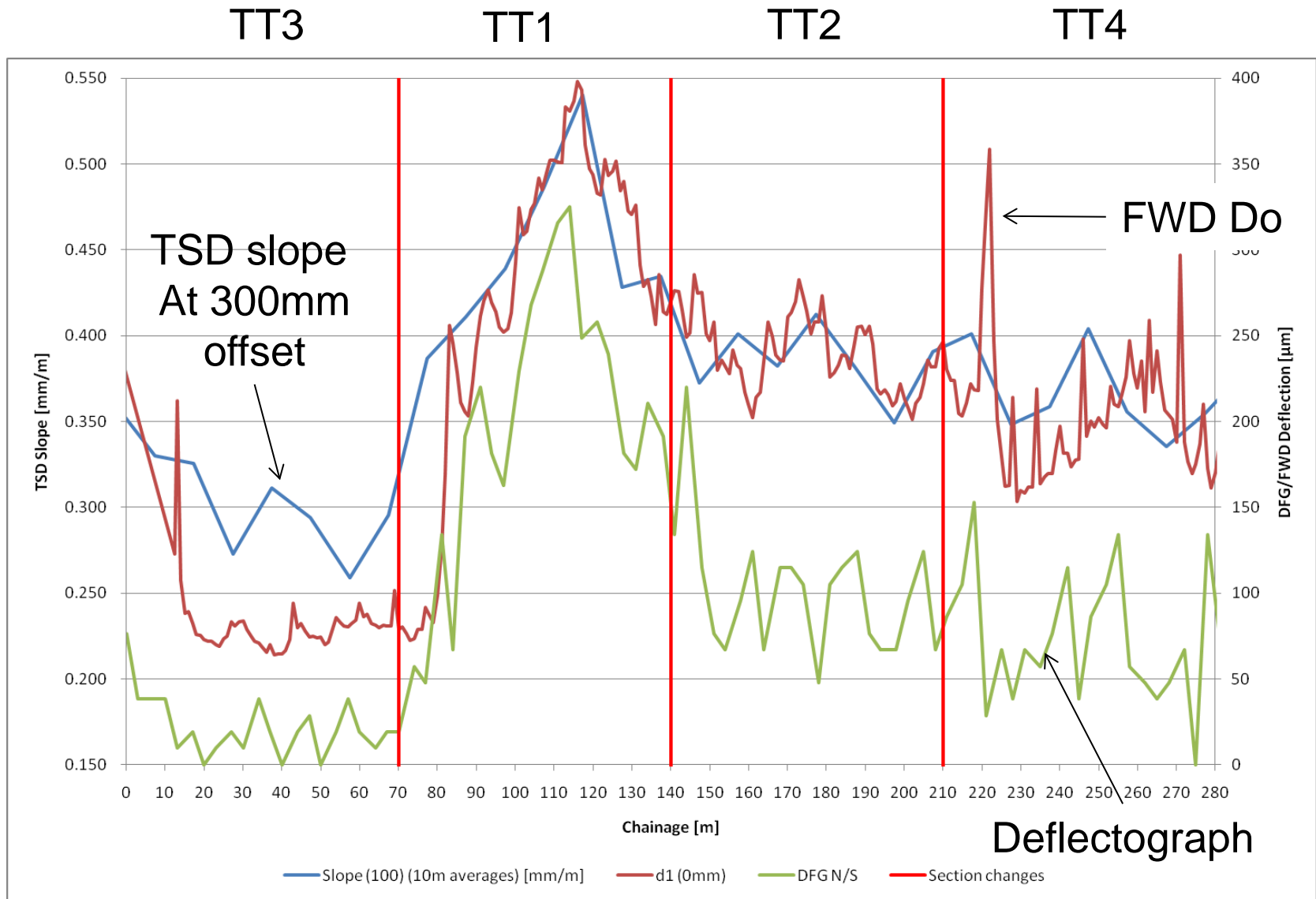
**National Pavement  
Evaluation Conference  
Virginia Tech**

15-18 September 2014

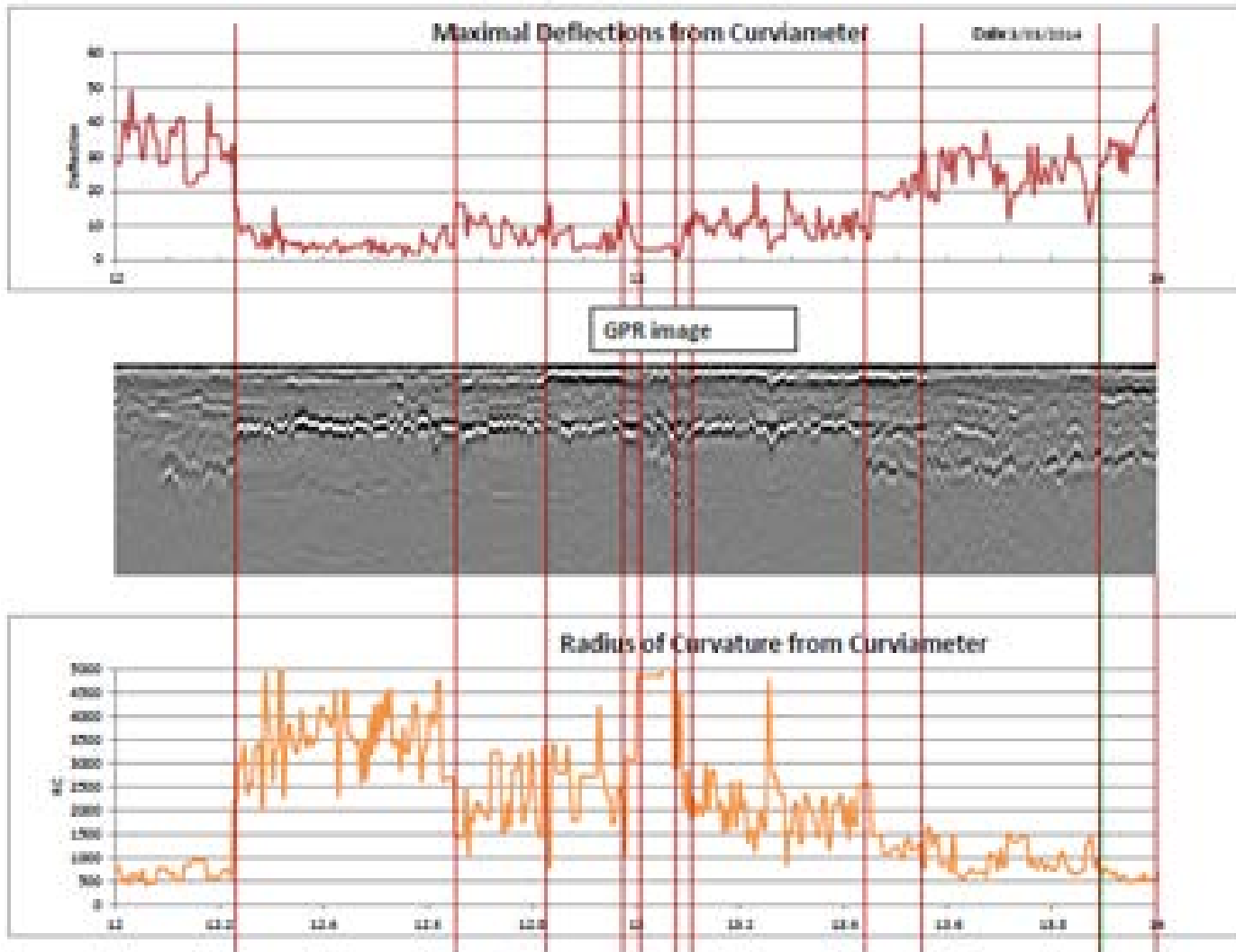


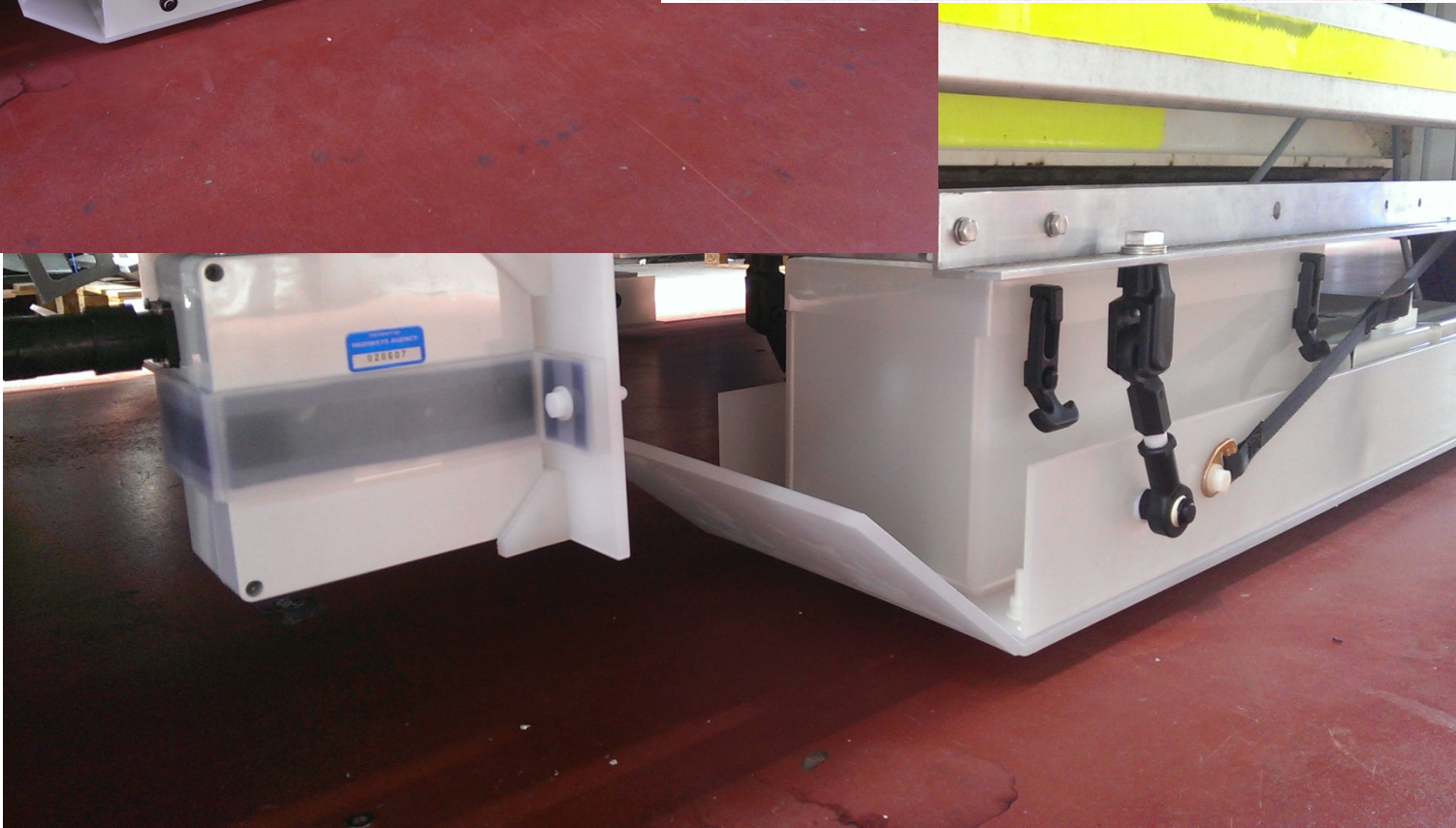
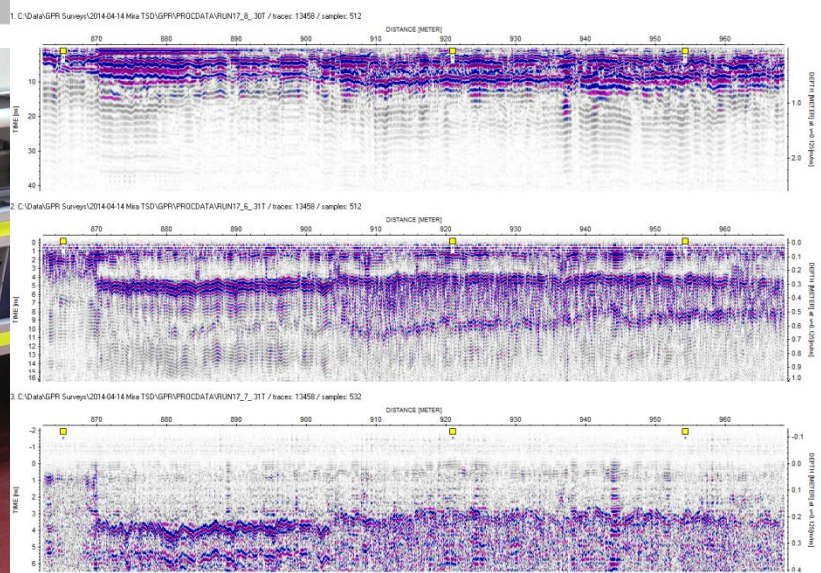
# Right measures?

# Deflection measurements on MIRA test sections



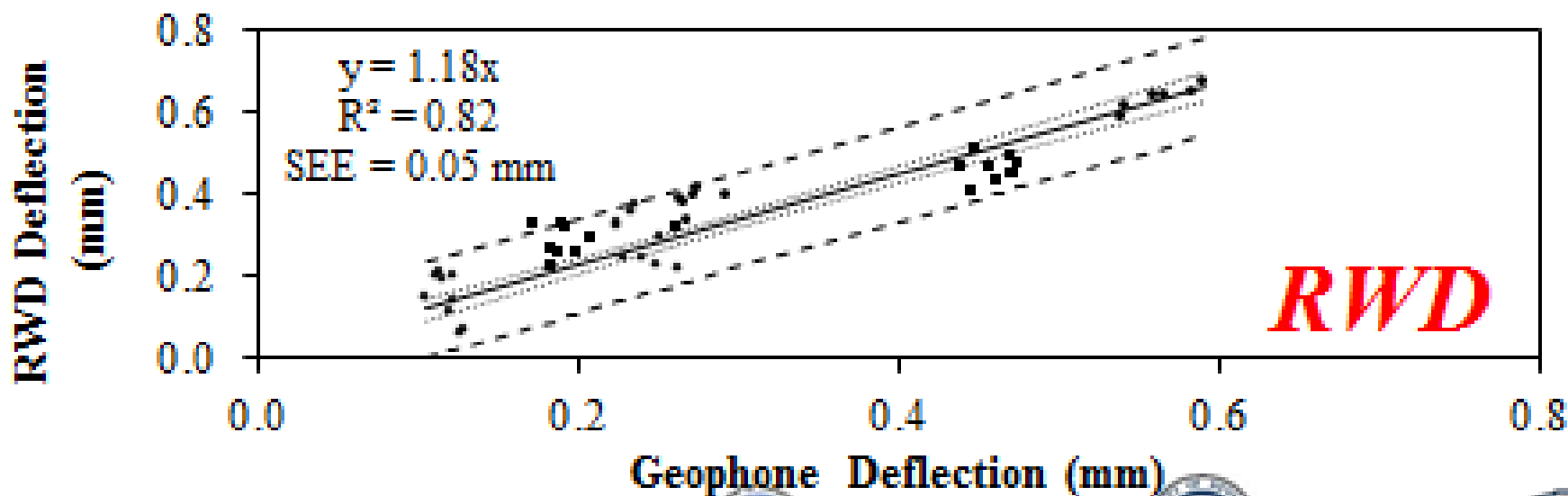
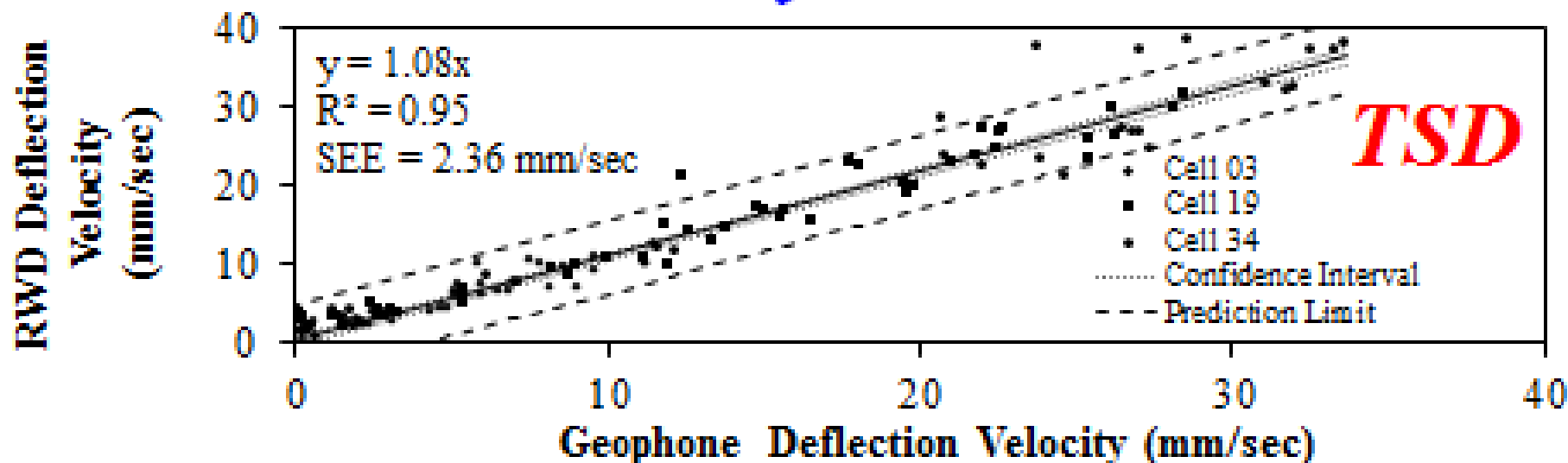
# HZ: Comparison GPR image and Curviameter data





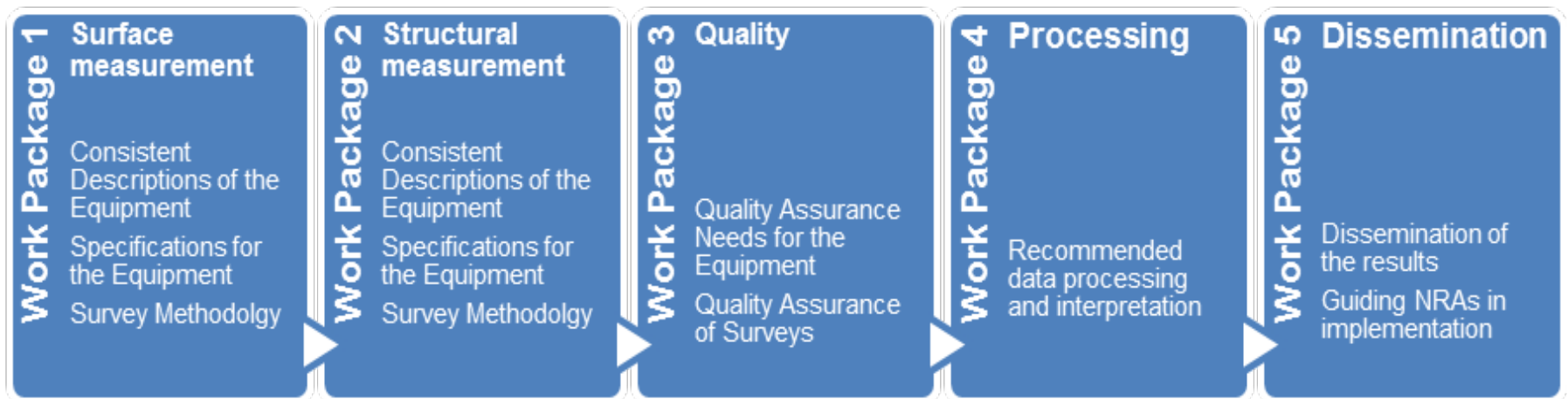
# Right quality?

# Overall Accuracy



# HI -SPEQ –European project sponsored by CEDR

- **Hi**-speed survey **SP**ecifications, **E**xplanation and **Q**uality
- Commissioned under the CEDR Ageing Infrastructure Management Call – High-speed non-destructive Condition Assessment. Managed by Ireland National Roads Authority
- 6 project partners (TRL, AIT, VTI, ZAG, COWI, Fugro). Start date 14<sup>th</sup> April 2014, Duration: 24 months
- HI-SPEQ will draw on a **Reference Group** of road owners & operators, **survey equipment builders & users**, Data users, researchers etc.



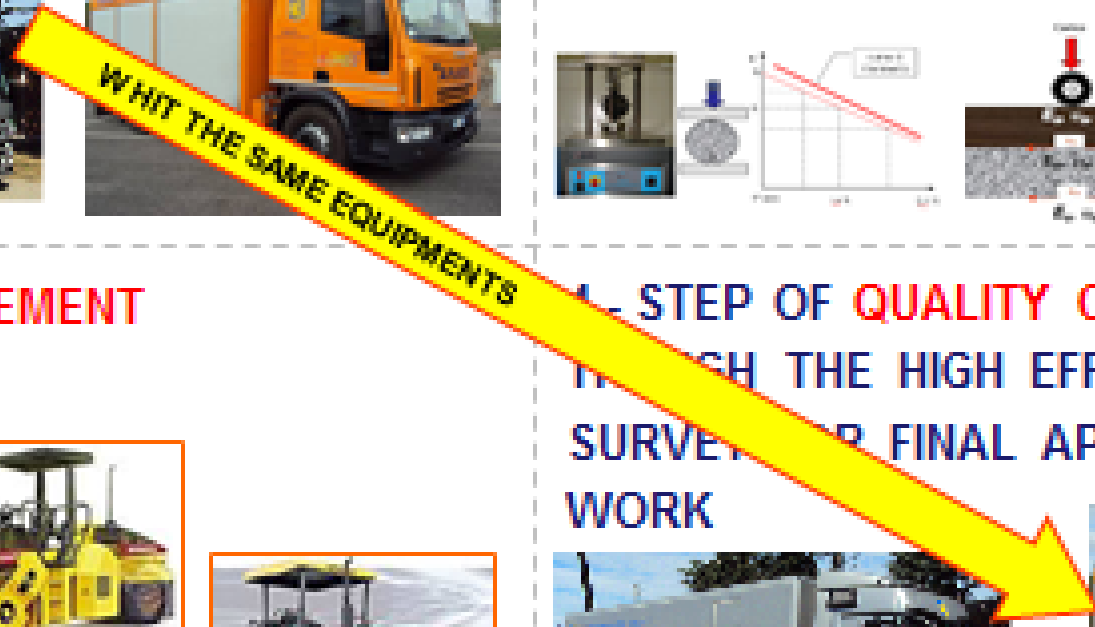
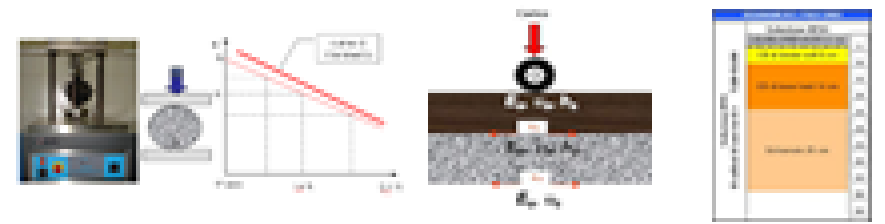


# Right analysis?



**1- STEP OF EVALUATION OF THE ACTUAL NETWORK CONDITION TROUGH THE HIGH EFFICENCY SURVEY**

**2 - STEP OF PAVEMENT DESIGN FOR NEW CONSTRUCTION OR FOR MAINTENANCE OF EXISTING PAVEMENT**



**3 - STEP OF PAVEMENT CONSTRUCTION**

**4 - STEP OF QUALITY CONTROL TROUGH THE HIGH EFFICENCY SURVEY FOR FINAL APPROUVAL OF WORK**



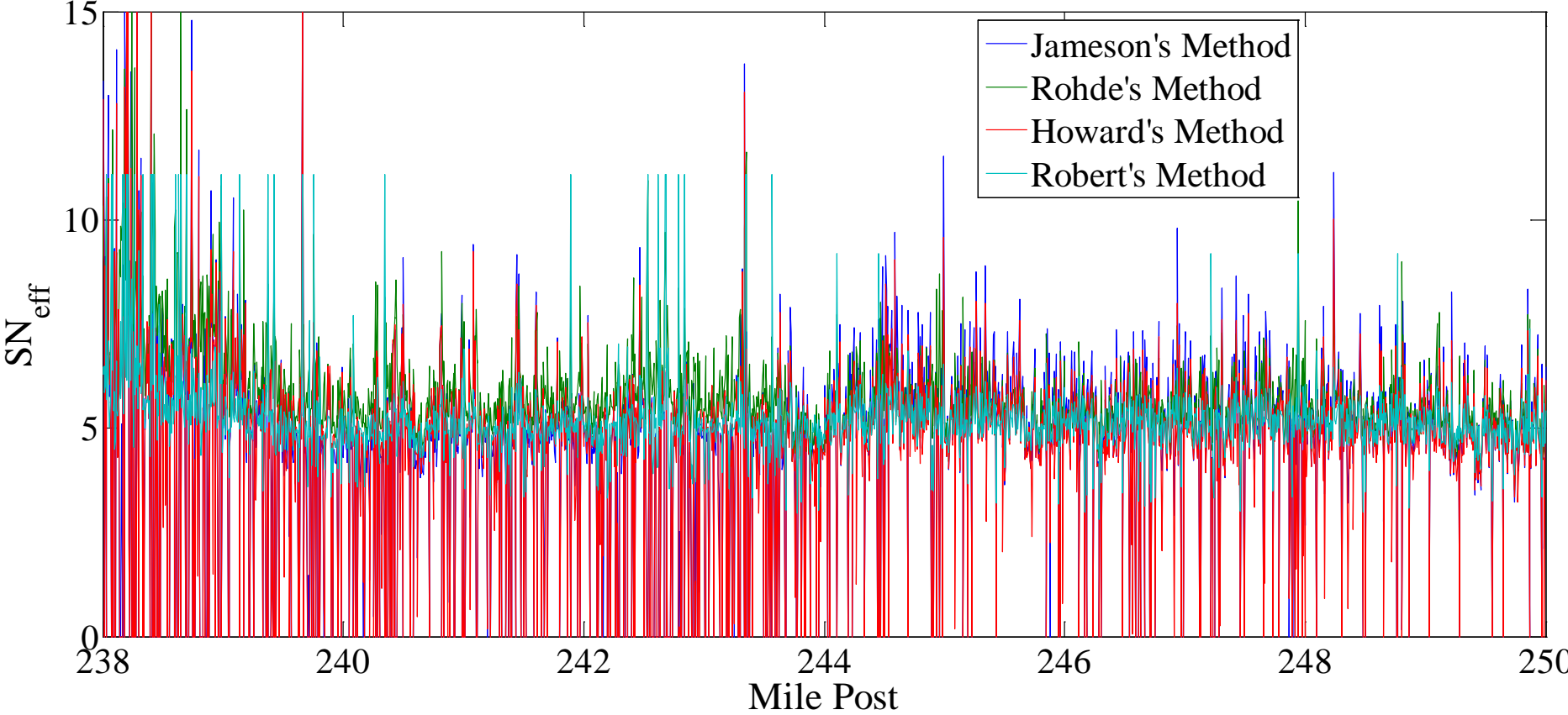


## Phase 2: What are the Robust Indicators that can Capture HMA Deterioration?

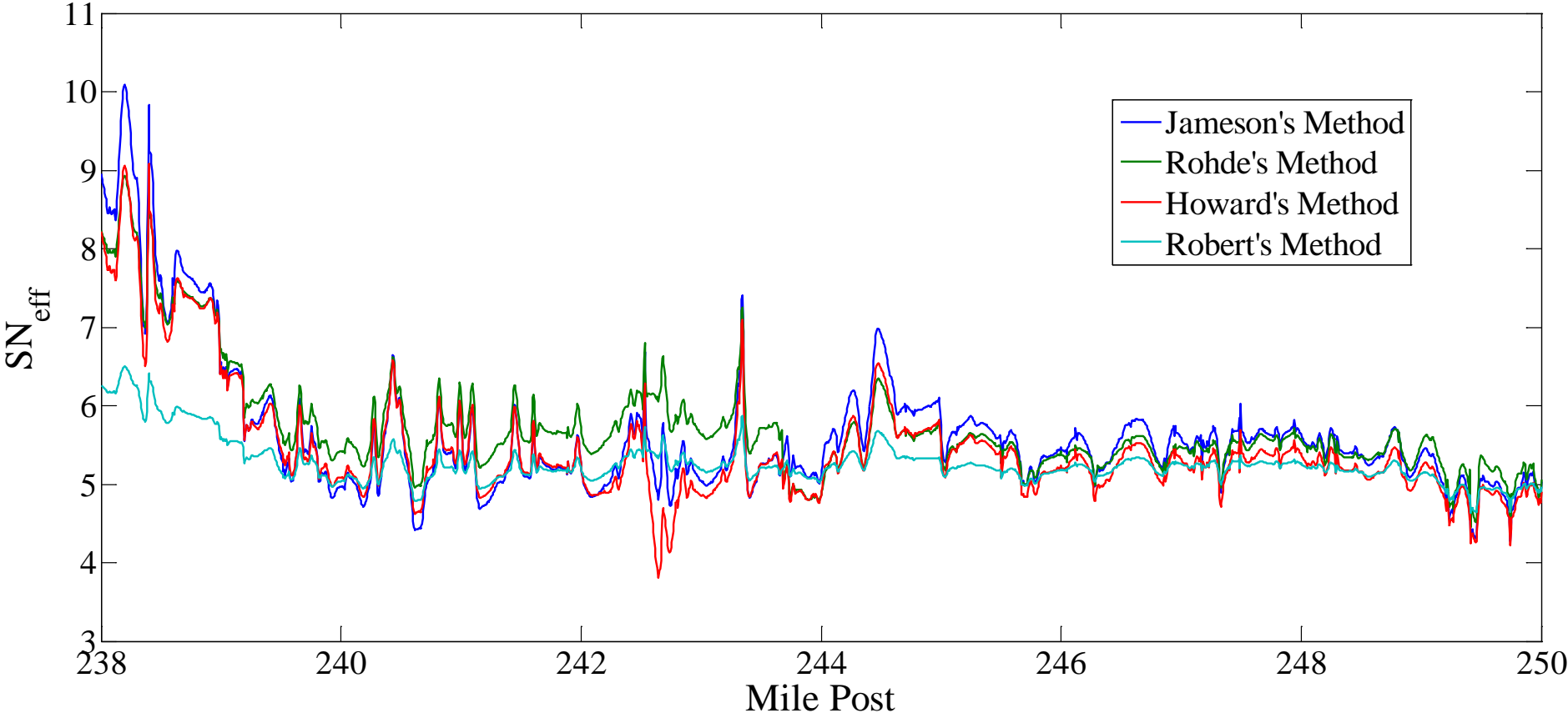
### Following Issues are to be Investigated by 3D-Move Solutions:

- (1) What is the sensitivity of measured deflections in HSDDs with respect to: (a) speed of test vehicle; (b) change in material properties of all pavement layers (i.e., temperature, aging and moisture related stiffness changes); and (c) sloping pavements (require inclusion of interface shear);**
- (2) Are there any other pavement response parameters that may be sensitive to pavement condition? For example, can the velocities measured in TSD be directly used as indicators, instead of relying on displacement bowl obtained using the slopes at a few locations (potentially introducing errors) recognizing that the focus is on surface bound layer;**

# Structural Number (Original)



# Structural Number (Denoised)



# Outlook

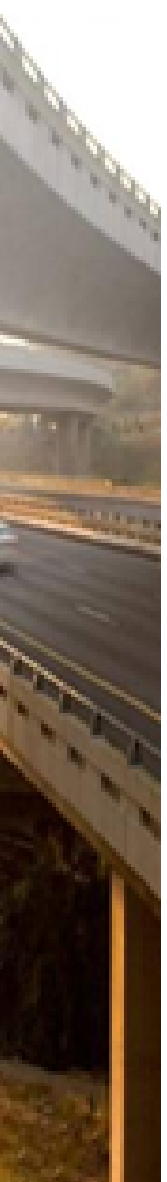
- TSD now has a status which brings us further on in (German) pavement evaluation
  - No disrupting of flowing traffic
  - Network monitoring is possible
  - Works also on stiff asphalt pavements
  - ...
- Need of evaluation methods which bring a benefit on network level and on project level as well  
(→ see plenary discussion on Monday “massive improvements in measurement techniques but not in analysis methods”)
- Further projects:
  - Test on selected parts of network
  - Repeatability tests at different times of year
  - ...



# Right quantity?

# SANRAL TSD Conclusions

- TSD measurements highly repeatable.
- TSD and FWD has same pattern but not exact match for valid reasons.
- The **100mm sensor** location on very flexible pavements?
- TSD Doppler Laser range **focus** is crucial !
- Deflection at reference **sensor 3.5m is not zero**, although slope is close to zero-relocate to 3.0m ?
- TSD Statistical Deflection model huge improvement over old beam model, but not 100% - **Muller/Roberts PCHIP curve fit**.
- TSD measures **real** pavement behaviour even at speeds as low as **2.5 km/h**.
- **TSD is not just network deflection scanning tool.**





# What is the benefit?



## Expected Benefits

- Field validation of TSDD measurements with pavement response
- Use to TSDD indices is expected to allow continuous monitoring of structural deterioration including the effect of preservation and rehabilitation.
- Possible application of TSDD for more than just delineating the weak pavement sections.
- Use of TSDD measurements for performance monitoring and budget planning at network level.





# Estimate Future Budget Requirements

