

Pavement Evaluation 2019



September 17-20, 2019
Roanoke, Virginia

Use of traffic speed deflection data in Australia

By

Richard Wix

Australian Road Research Board



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Acknowledgments

- Michell Baran (TMR)
- David Svolos (TfNSW)
- Zahid Hoque (TfNSW)
- David Whitehead (ex NZTA)



The fruit basket



Healthy choice option



What's in the basket?

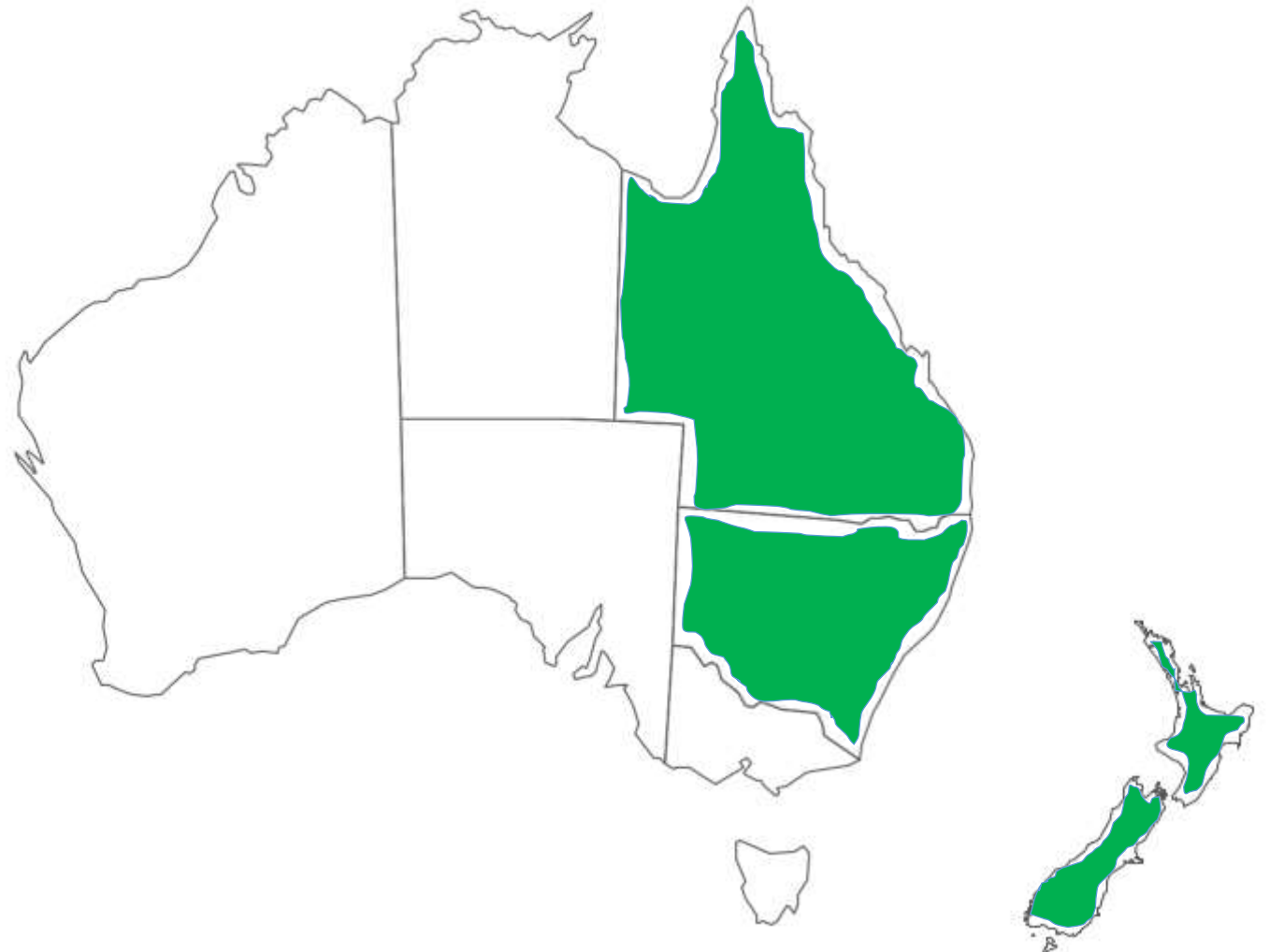
- Longitudinal profile
- Transverse profile
- Macrotexture
- Geometry
- Digital imaging
- Automated crack detection
- Deflection velocity



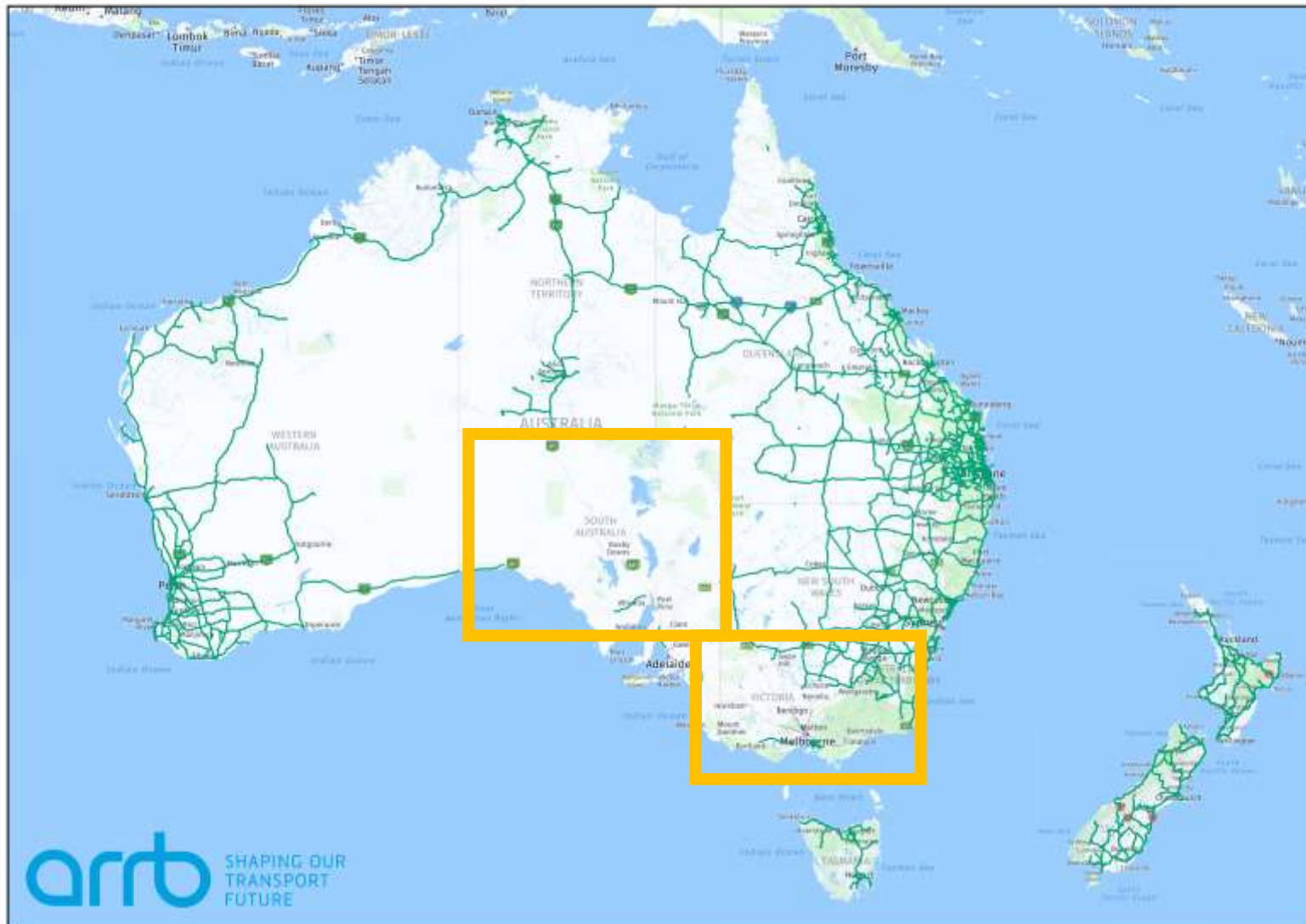
iPAVe collection

Since 2014:

- Queensland (105,000km)
- New South Wales (87,500km)
- New Zealand (46,000 km)



iPAVe coverage - Australia & NZ

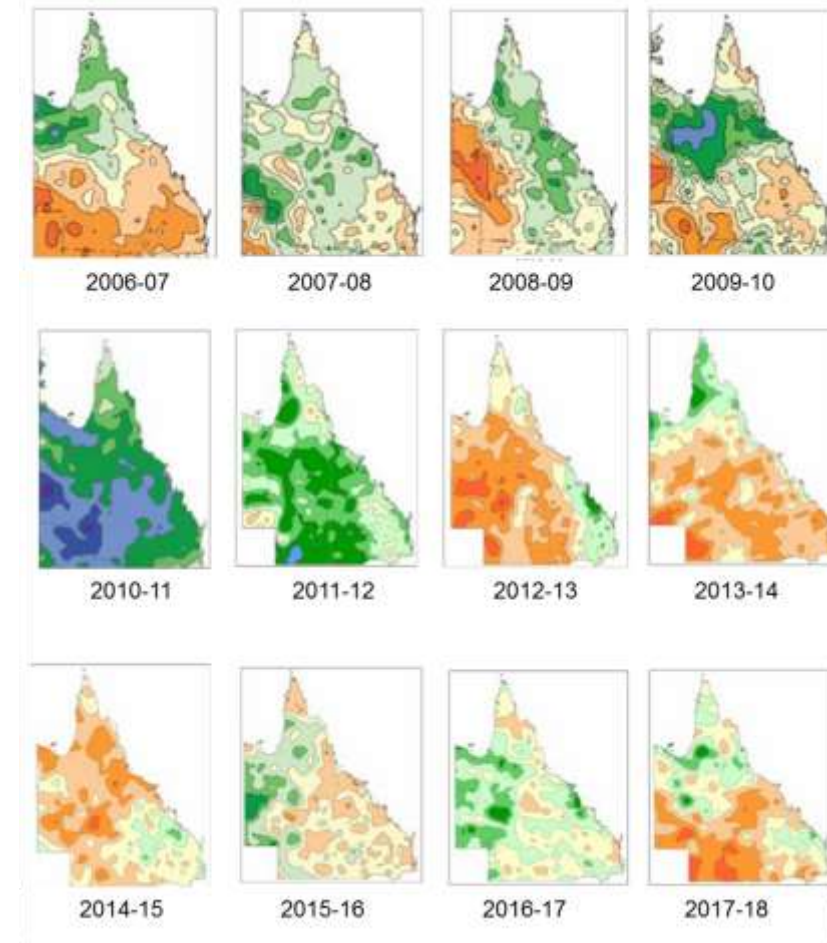


Queensland



Drivers for network-level strength data

- Need more than surface condition data
- Age ineffective measure of pavement quality
- Improve asset management decision-making
- Challenges:
 - Weather patterns diverging from either extreme
 - Large freight network → increasing axle loads
 - Low-cost widening to achieve safety outcomes
 - Rapid growth in the resource industry



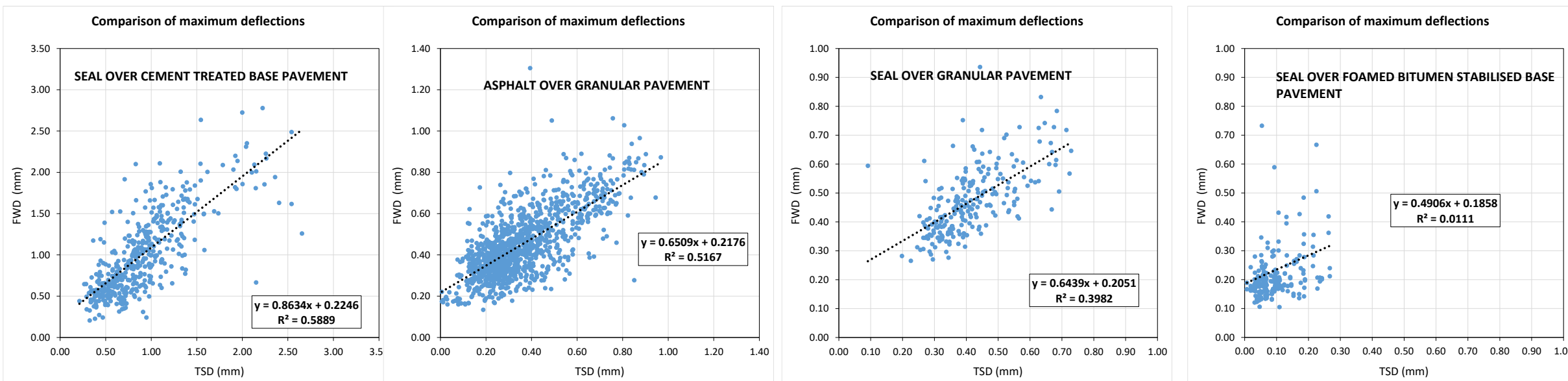
P40 - Benefits of TSD Data in Pavement Analysis

Project delivered under NACOE (National Assets Centre of Excellence) - *an initiative between ARRB and TMR*

- Correlation study to relate the Falling Weight Deflectometer (FWD) with the TSD
- Field instrumentation installation to independently measure pavement surface motion
- Comparison of TSD data obtained from successive years of surveying the Queensland road network

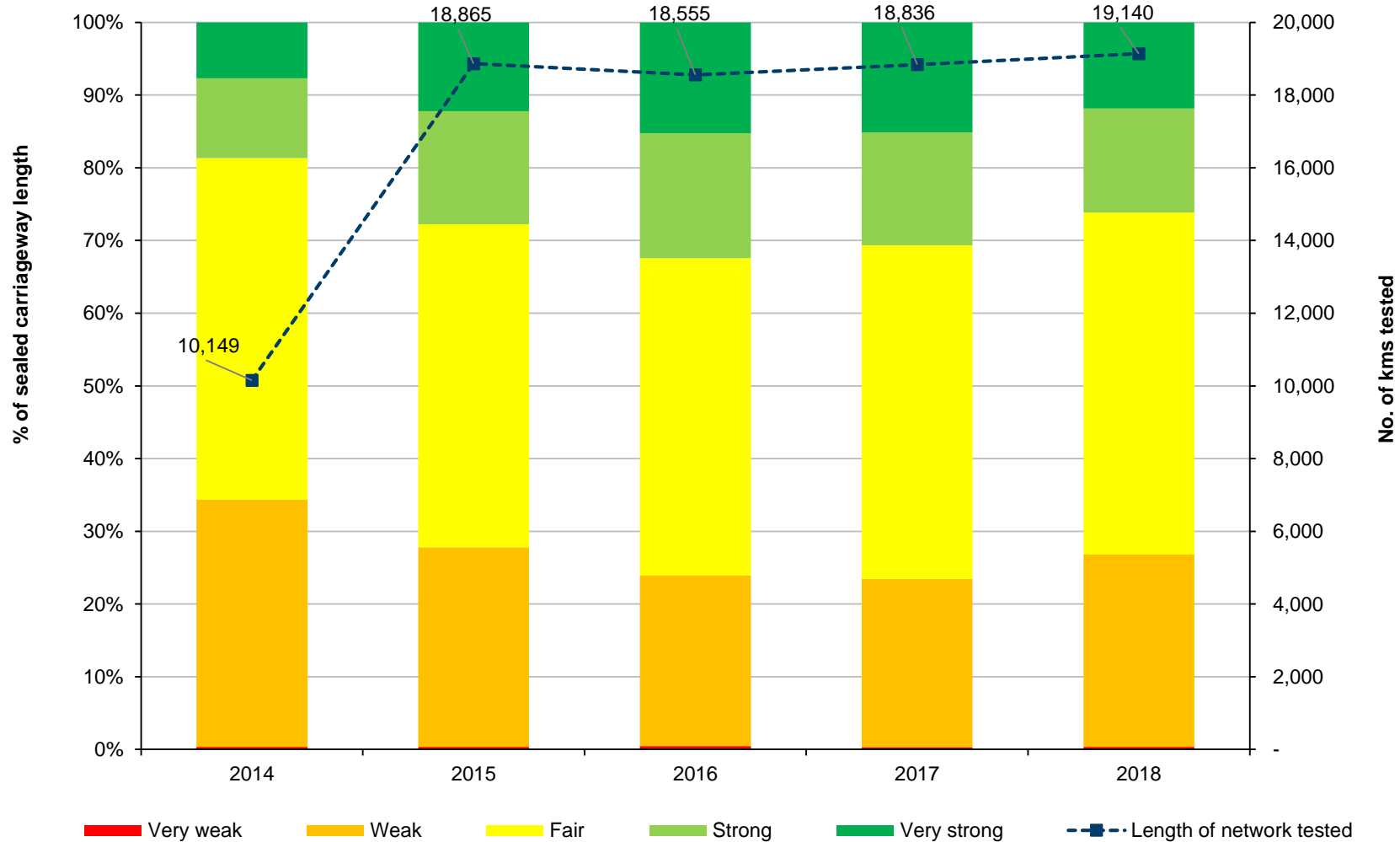


FWD / TSD correlation - 2015

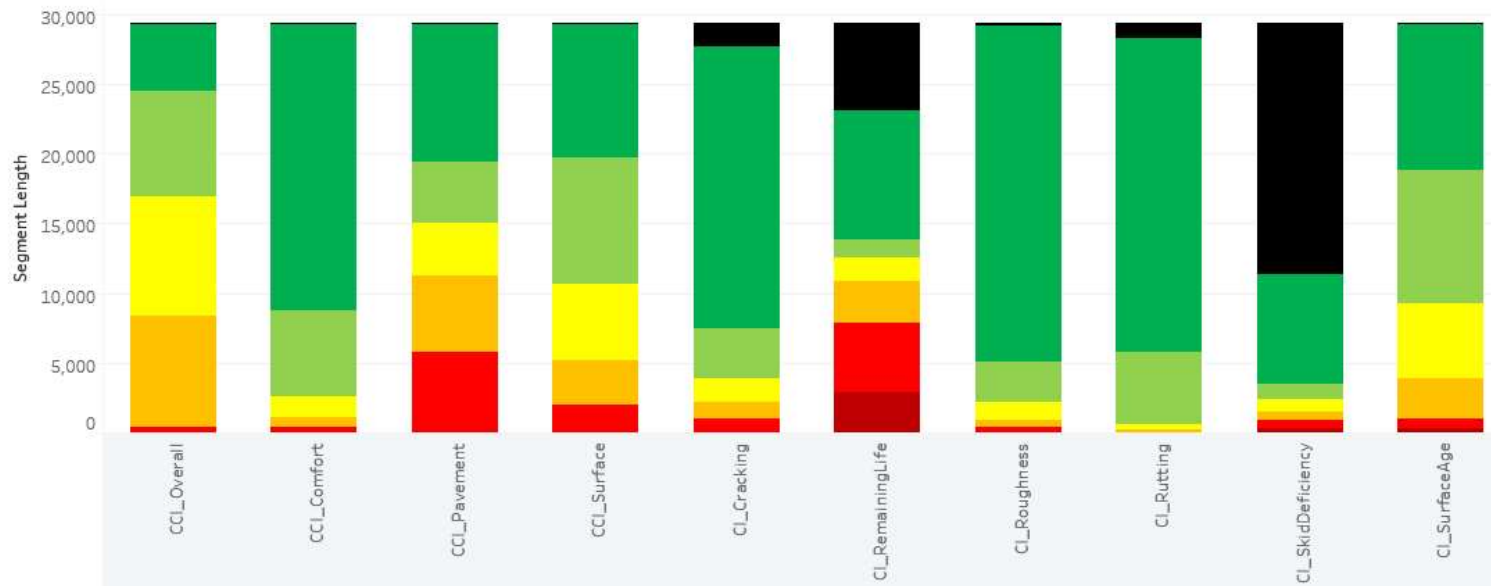
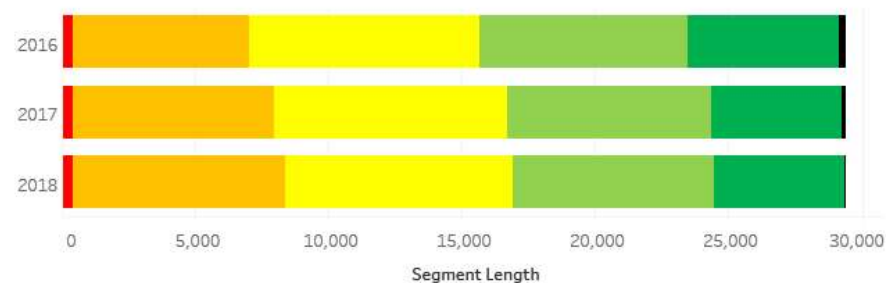
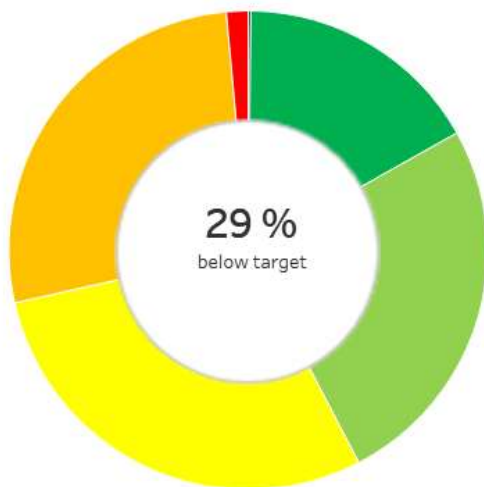


Source: NACoE P40 *Benefits of Traffic Speed Deflectometer Data in Pavement Analysis (TSD and FWD correlation study and investigation to 'ground truth' instrumentation) (Year 2 – 2015/2016)*

Simplistic reporting of strength

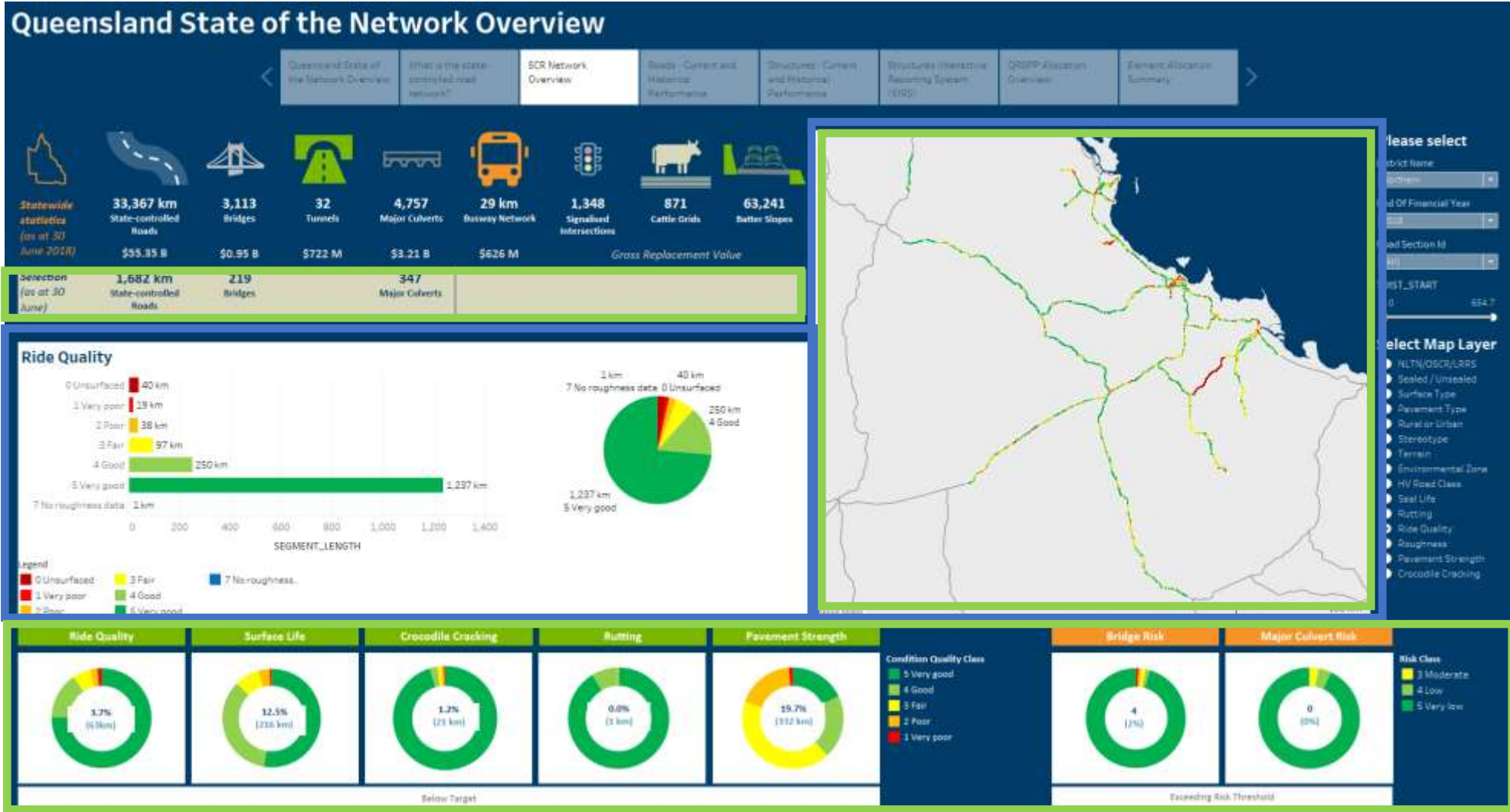


Pavement Condition Indicator





SCR Network Overview



Network Statistics

Area Selection

Measure Breakdown

Display Measure

Performance Profiles



Other work

- Incorporating pavement strength into pavement risk score to assess pavement risk from the perspective of both road user safety and road agency life-cycle costs
- Incorporating strength data into TMR's in-house rule-based decision support tool used in pavement management
- Incorporating strength into deterioration models



Future initiatives

- Continued investment in network-level strength data
- Finalise implementation of strength into PMS modelling
- Continued evaluation of strength data at the project-level
- Roll out of information dashboards (incorporating Pavement Condition Index and its sub-indices)
- Data analytics incorporating BOM/CSIRO soil-moisture data to improve predictive modelling



New South Wales

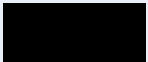


TSD versus traditional systems

- There are fundamental differences e.g. loading type and speed, measurement technique and analysis etc.
- Correlation studies have had limited success
- Direct comparison can be misleading
- Traditional systems more suited to project level work
- Instead of comparing against traditional equipment, effort should be directed to maximise the use of TSD data



Application of TSD/iPAVe data

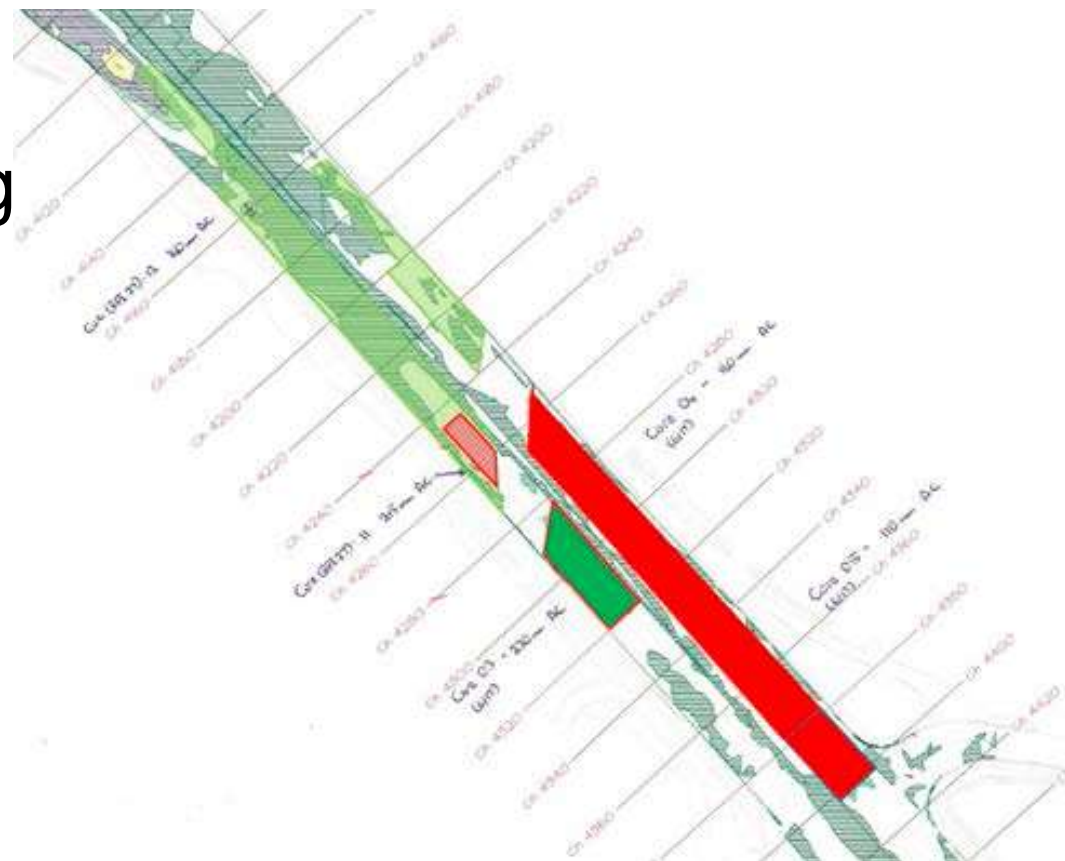
Intended purpose	Confidence level
Identifying weak pavement areas	Very high
Estimating pavement remaining life and pavement layer thickness using 	High
Using estimates of pavement remaining life to trigger future work programs	High
Pavement rehabilitation design	More work required to assess usefulness for pavement rehabilitation design

Use of TSD data for project level analysis

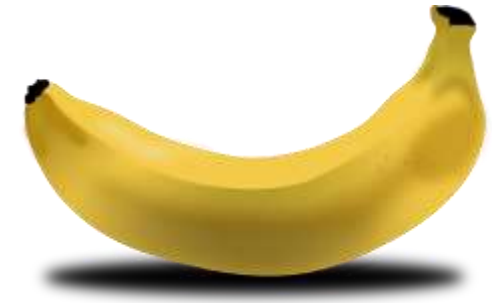
Requires more project specific data

Used a risk based approach

- pavement remaining life estimated using TSD data and the [REDACTED] structural analysis program
- sections identified as high risk targeted for heavy patching



NSW summary



- confidence in using TSD data for network-level analysis is very high. Examples of use include identifying weak and homogeneous areas, developing forward maintenance programs and use of risk profile assessment
- For project level analysis more study is required to establish relationships e.g. standardisation factors used in the design methods
- Limited analysis showed there is potential for TSD data be used in the overlay design and identifying risk profiles of pavements where funding and time constraints are critical.

New Zealand



What has been the benefits to NZTA?



- Continuous coverage of pavement structural condition across the SH network at traffic speed = greater coverage of network/survey
- Improved input into pavement deterioration models = improved pavement management and investment decisions
- Ability to collect comprehensive cracking data for the first time
- Reduced traffic management need during data collection = less disruption to the customer
- Compatibility with existing data collection system (FWD)



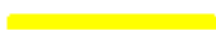



Proviso

“While the equivalent FWD bowls can be used in pavement analysis, the results, at this stage, should be treated as a ranking tool rather than providing absolute results”



New Zealand - Kaikoura Bypass



-  National
-  Regional
-  Arterial
-  Primary Collector
-  Secondary Collector
-  Detour Marker

New Zealand - Kaikoura Bypass



- iPAVe was used to highlight the weak areas of pavement
- raised a red flag where the iPAVe inferred weakness corresponded to visual distress
- FWD and iPAVe data used to estimate subgrade CBR for design of pavement strengthening measures

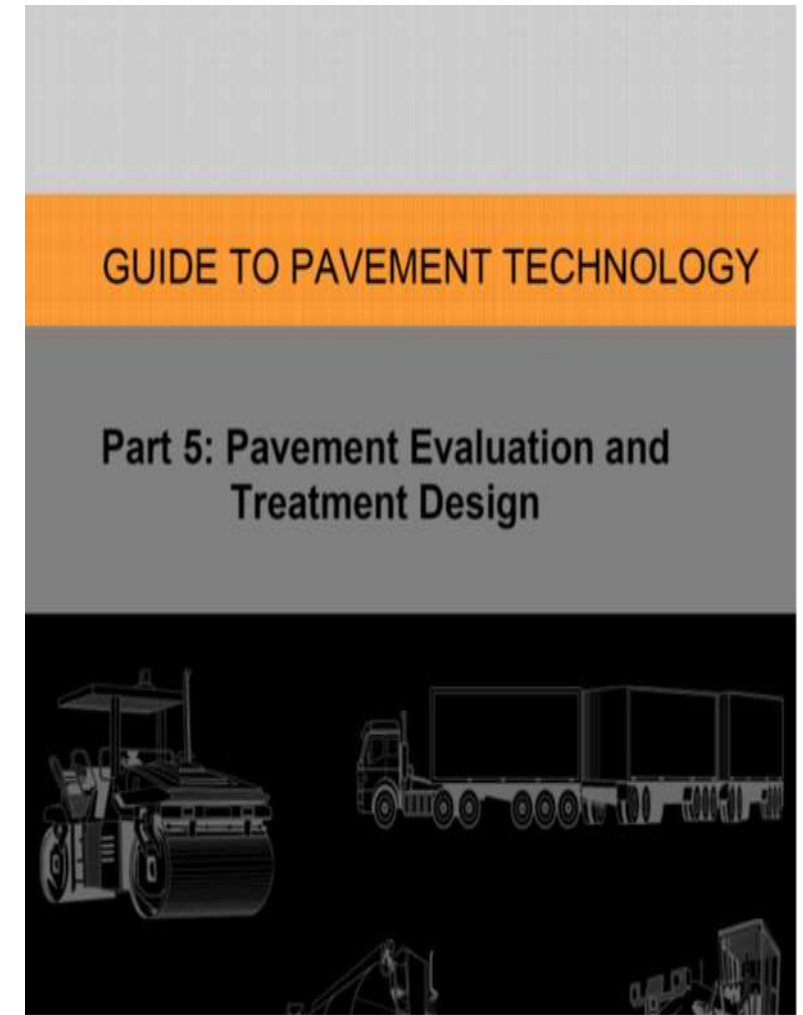
Outcome of alternate route analysis

- NZTA should develop a robust statistical parameter for the iPAVe data to monitor pavement strength for investment and strategic asset management at a Network/National/ONRC level in the same way in which roughness, rutting, texture and skid resistance is used.



Other developments in Australia

- Guide now includes procedures for the thickness design of structural treatment for flexible pavements using TSD



Austrroads Project APT6101: Part 5 Revision

New method for designing granular overlays

- Adjusted characteristic D_0 can then be used to calculate granular overlay thickness to strengthen the pavement for future

Table 9.2: Deflection standardisation factors

Deflection measurement device	Deflection Standardisation Factor
Deflectograph, 80 kN single axle with dual tyres	1.2
TSD, 50 kN dual tyres	1.2
Falling Weight Deflectometer, 40 kN load	1.1

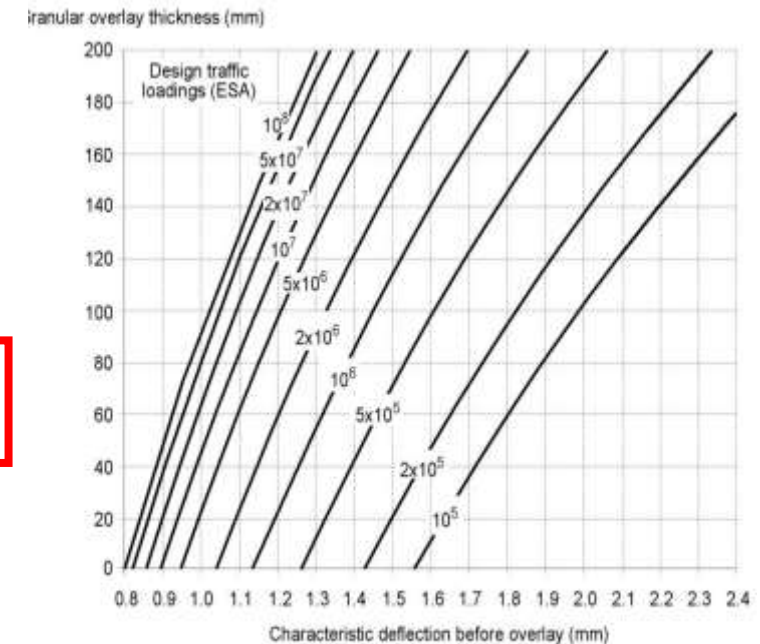
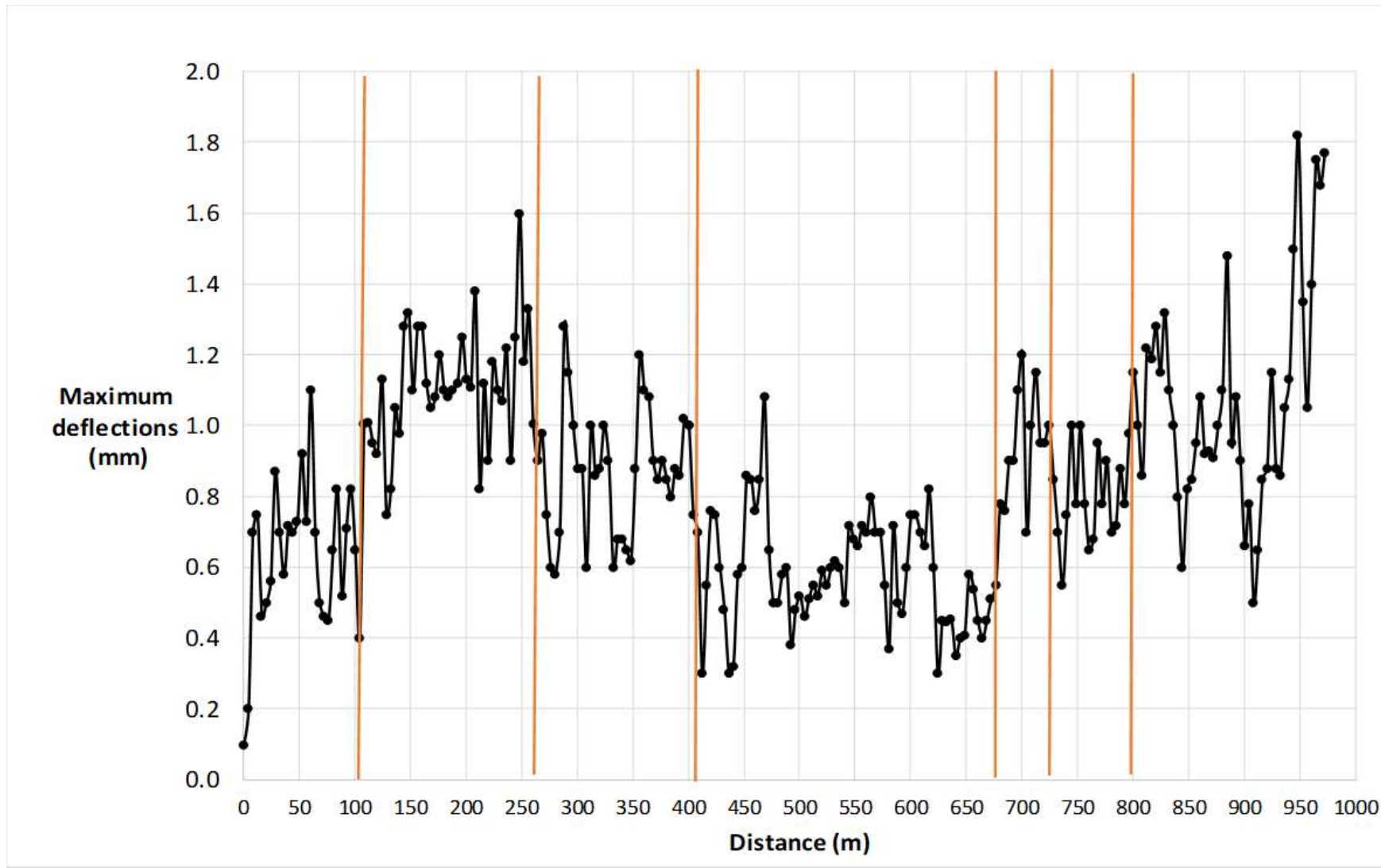
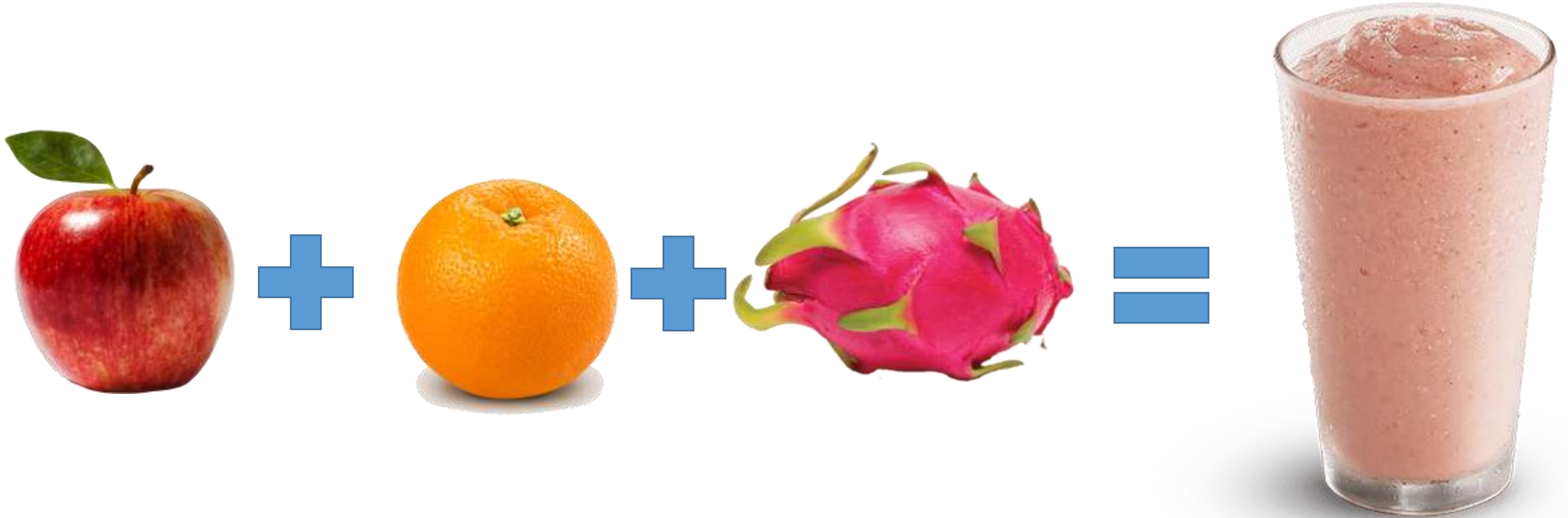


Figure 6.7: Granular overlay design charts

Identifying homogeneous sub-sections for design of structural treatment



Conclusion



Happy snap



Thank you

