WARRIP
WESTERN AUSTRALIAN ROAD RESEARCH & INNOVATION PROGRAM

Improving pavement deflection bowl predictions

Reference: 2022-002 Published: October 2025

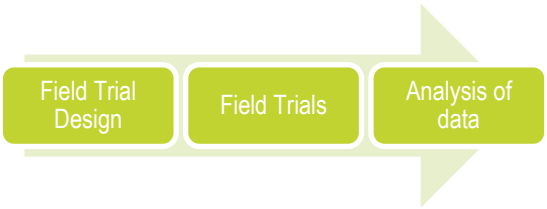
The traffic speed deflectometer (TSD) used to collect road condition data and road deflection data has recently been upgraded from seven to eleven lasers. WARRIP is investigating how the additional lasers improve the deflection bowl predictions used for determining pavement strength and in layer moduli calculations.

Background

Traffic Speed Deflectometer (TSD) differs from other deflection measuring devices in terms of its mechanism for data collection. Unlike Falling Weight Deflectometer (FWD) which directly measures pavement deflection, the TSD measures surface deflection velocity resulting from a rolling wheel. As velocity data is then converted to deflection data the deflection data is based on indirect measurements.

The additional lasers on the TSD allow for measurement beyond 900 mm and up to 1500 mm offset which means we will be collecting a wider deflection bowl with less inferred information.

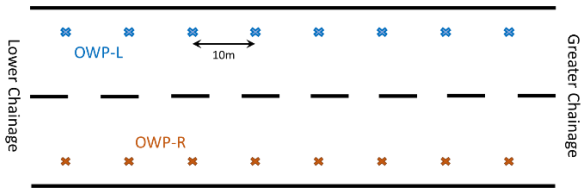
Approach



FWD Testing

The FWD testing was carried out in parallel with the TSD testing in order to have simultaneous comparison data for the same section of road.

FWD configuration Ipswich Rosewood Road, Amberley

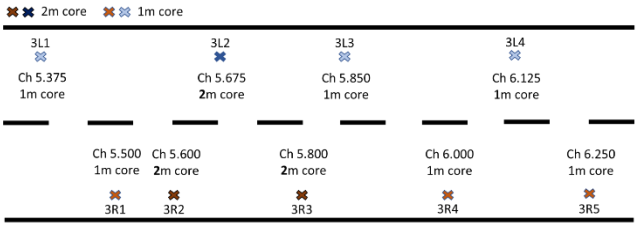


Source: NTRO 2024

Field Sampling

Coring, moisture testing and weather conditions where recorded at each of the field tests in order to have detailed information regarding the pavement structure and environmental conditions related to the TSD testing.

Illustration of coring locations



Source: NTRO 2024

TSD Testing

Three rounds of testing were conducted before the data was satisfactory for research purposes. The additional sensors are positioned in front of and behind the rear axle on both right and left wheel paths.

iPAVe3 data collection on Ipswich Rosewood Road, Amberley

Source: NTRO 2024

Findings

Finding are still underway as further analysis of the data takes place.

Next stage

There is more to be learned from this data set. Additional research to maximise the findings would help everyone to understand how to apply the data and correlate it to old data sets from previous TSD condition assessments.

Observations to be confirmed

Previous research on TSD

Present the findings to date and get feedback from the users of the TSD data.

References

If required provide references e.g. Austroads, Main Roads document references.

How does this research change the way we think?

Better interpretations of pavement strength will help optimise maintenance of roads and provide additional data to support new pavement design.