ASPHALT ROAD SURFACE NOISE

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Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Using CPX Trailer and Method

WHAT I WILL COVER TODAY

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- Motivation behind the research
- Vehicle noise sources
- Asphalt surfaces
- Measurement methods
- CPX method
- Phase 1 – Verification of trailer performance
  - Opus and UC Data Collection differences
  - Results
  - Conclusions
- Phase 2 – Longitudinal variation
- Phase 3 – High performance asphalts
- Programme of works
- Resources required
- Outcomes and deliverables

MOTIVATION FOR THIS RESEARCH

- Road traffic is one of the most prevalent sources of environmental noise.
- NZ Transport Agency has commissioned this research project to look for methods to reduce community noise exposure and annoyance.
- Focus is on asphalt surfaces

VEHICLE NOISE SOURCES

- Propulsion
- Tyre/road
- Aerodynamic

- Propulsion dominates at lower speeds whereas tyre/road noise dominates at higher speeds.

- This research focuses on the tyre/road noise

ROAD SURFACE NOISE

- Stiffness
- Texture
- Porosity

ASPHALT SURFACES

- Standard OGPA – 15-20% volume of voids
- High performance OGPA – 25-30% volume of void
- 2dB reduction in noise with OGPA

MEASUREMENT METHODS

Source or wayside noise measurements

- Statistical Pass-By method (SPB)
- Controlled Pass-By method (CPB)
- Continuous flow traffic time-integrated model (CTIM)
- Backing board (BB)

- Close-Proximity (CPX) method
- On Board Sound Intensity (OBSI) method

THE CLOSE-PROXIMITY METHOD AND TRAILER

- Can be car or trailer based
- Only relevant when tyre/road noise dominates
- Can not take into account heavy vehicles
- Measures properties of road surfaces and not tyres
- Can measure any location for entire length rather than at discrete points
- Requires strict specifications for enclosure design and requires investment into measuring vehicles
- Can check for homogeneity of road surfaces

PHASE 1 – VERIFICATION OF TRAILER PERFORMANCE

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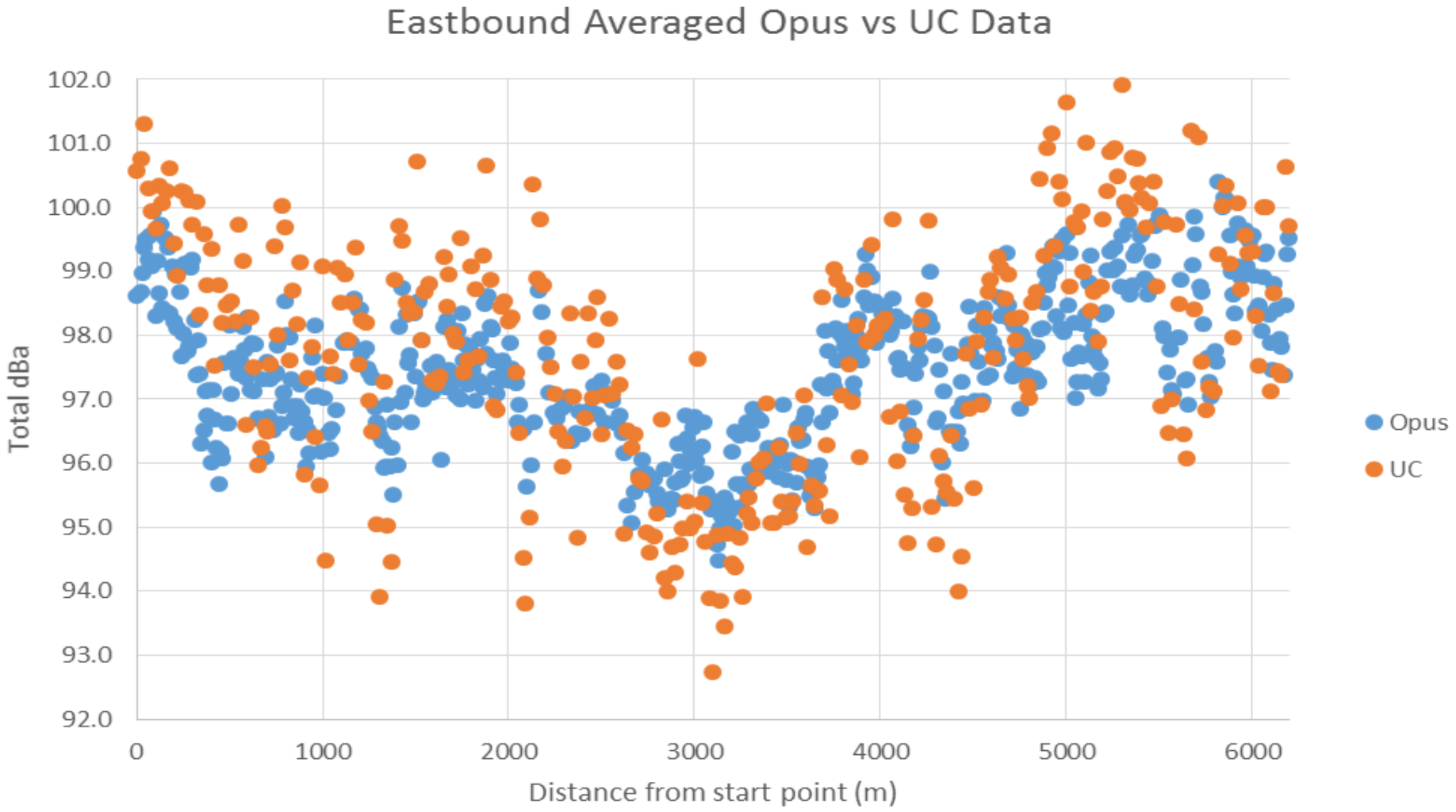
Data must be:

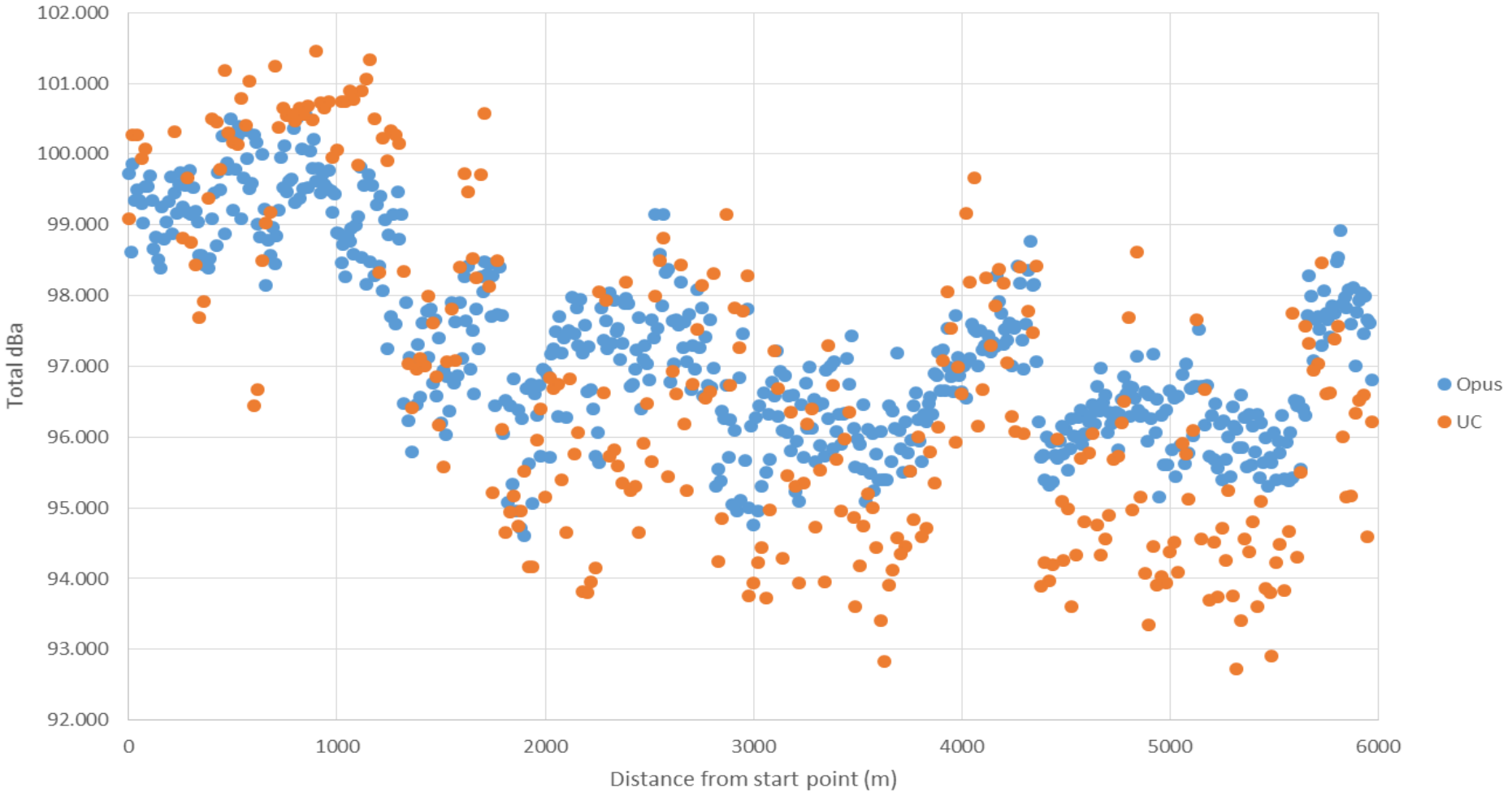
- High quality
- Repeatable
- Consistent
- In accordance with ISO 8819

OPUS vs UC DATA Differences

- Opus used RS/RP coordinates where as UC used longitude/latitdude
- Fault with one of the microphone shields affecting the 5000th Hz band – data collected at 315-4000 Hz. UC data was collected between 315-5000HZ
- Data collected at 17-23m sections vs UC at 20m sections
- Opus had 5 runs eastbound, 6 runs westbound. UC only had one run each way

AVERAGED OPUS DATA VS UC DATA




Westbound Averaged Opus Data vs UC Data
Total dBa
102.000
101.000
100.000
99.000
98.000
97.000
96.000
95.000
94.000
93.000
92.000
0
1000
2000
3000
4000
5000
6000
Distance from start point (m)
Opus
UC

CONCLUSIONS

- UC recorded higher and lower dB
- Overall well correlated
- CPX trailer is a reliable method to use for measurement of asphalt tyre/toad noise

PHASE 2 – LONGITUDINAL VARIATION

- Working with contractors and their technical specialists
- Comparing laying logs and recorded tyre/noise data

- Reasons behind longitudinal variabilities?

PHASE 3 – HIGH PERFORMANCE ASPHALTS

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- 3 test sites – varying void content and aggregate size
  - Control – standard voids and aggregate size
  - 25-30% voids, same size aggregate
  - Standard voids and smaller aggregate

OUTCOMES AND DELIVERABLES

- Health and Safety Procedures Document
- Thesis/NZTA Report
- Update Road Asset Management Manual (NZTA)
- Update NZ Transport Agency Specifications in the Road Noise Guide

THANK YOU FOR YOUR ATTENTION