City of Mitcham – The Innovation Council

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Using Car Tyres in Roadworks Rather than Waste To Landfill

Presented by the City of Mitcham

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Thankyou

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Tyre Stewardship Australia;

- Liam O'Keefe who funded the project
- Meagan for her help with publicity!

TyreStewardship AUSTRALIA

Liam O'Keefe

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Thankyou

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Team at Topcoat and specifically Rod McArthur the technical expert!

Topcoat ASPHALT

vsa roads

Member of COLAS WE OPEN THE WAY

Performing Locally **Supported Globally**

Rod McArthur rodmc@topcoat.com.au

USA (California) – Environmental Reasons

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- Used extensively over last 20 years with success
- Became mandated for environmental reasons with minimum tyre quantities specified
- 2016 = 27,620 tonnes of rubber!!!

Spain- Environmental and Austerity

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Number of rubber tyre fires

Tyre cheaper than bitumen so used to save money and has now done over 1,600kms in last 20 years throughout Spain

But why tho?

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- Longer life through additives within the tyre to prevent oxidation (carbon black)
- Crack resistance through increased flexibility even when done as an overlay on an existing cracked seal
- Strength, particularly resistance to rutting and heavier traffic loads

Whenever you find yourself on the side of the majority, it is time to pause and reflect…

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Hold on, so what exactly is crumb rubber?

So WHAT is a crumb rubber asphalt??

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- **Dry mix** - particles mixed in with the aggregate
- **Wet Mix**
  - Terminal Blend - 100% dissolved into the binder, but then can be stored and transported for later use
  - Mobile Blend – mixed into the binder on site and so the rubber particles don't completely dissolve, however requires specialised pumps and plant

The crumb rubber being used in our trial

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- Wet (Terminal) blend (transported from Victoria)
- 15% crumb rubber in the binder for trial
  = Roughly 1 tyre per tonne of mix
- Net bitumen binder 4.6% (instead of 5.5%)
- Warm mix additives so no smell (lay at 165^{o}C)
- Extensive preliminary geotechnical investigation, survey marks for movement, NSV for surface defects and on going monitoring

Stanlake Ave, St Marys Trial Site

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- Long straight road (easy for a trial)
- Extremely reactive soil – class E (extreme)
- Low subgrade strength (CBR of 3)
- Extensive environmental cracks in new pavement and seals adjacent within 6 months of completion

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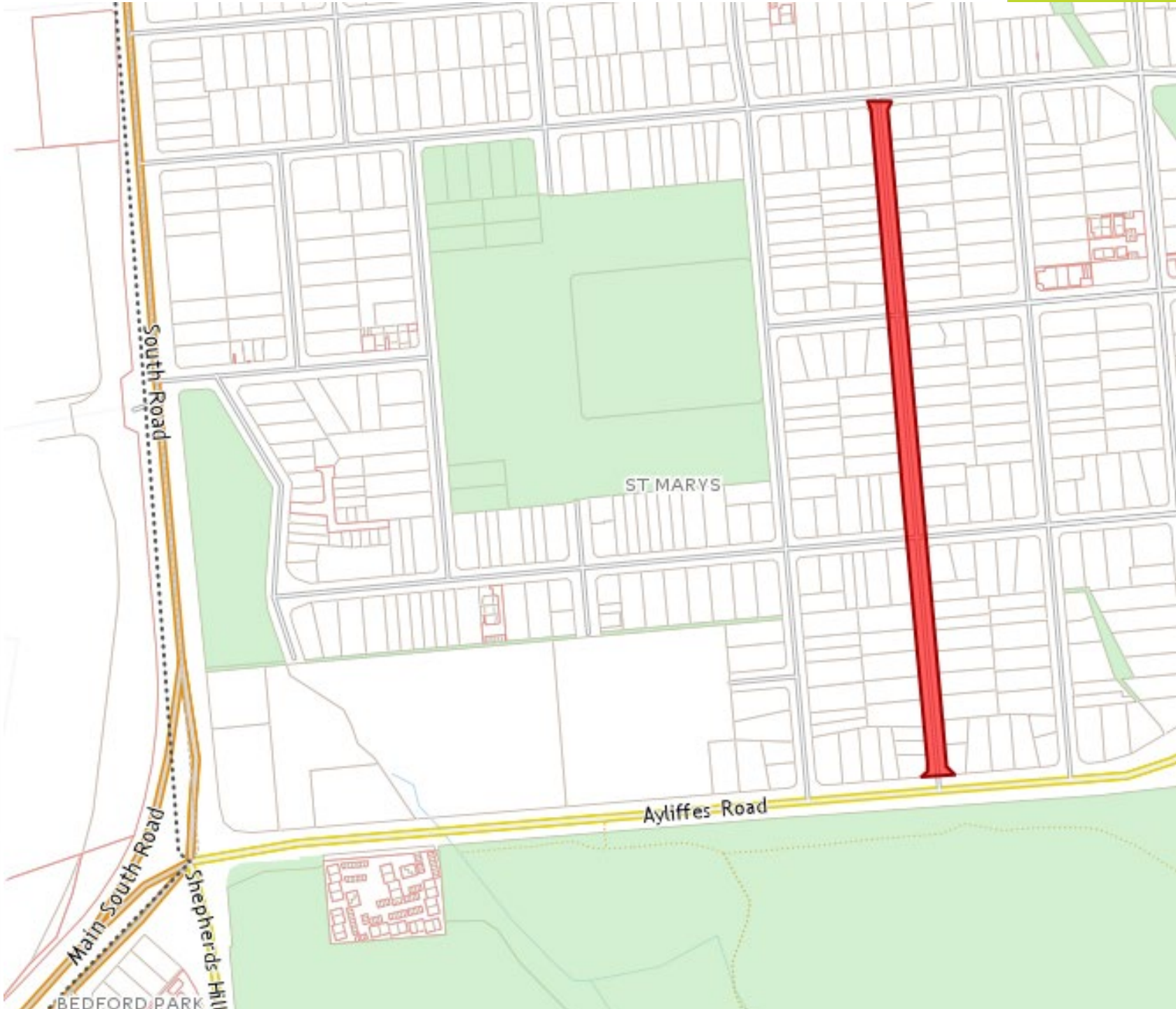

Stanlake Ave - Asphalt Arrangement

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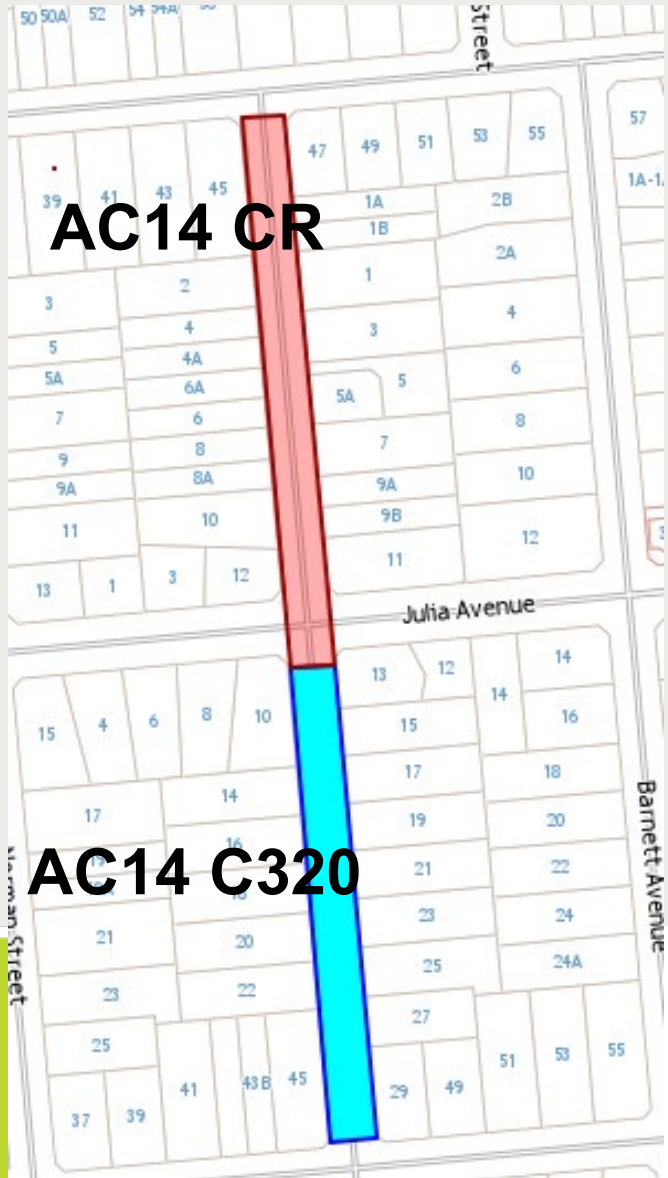

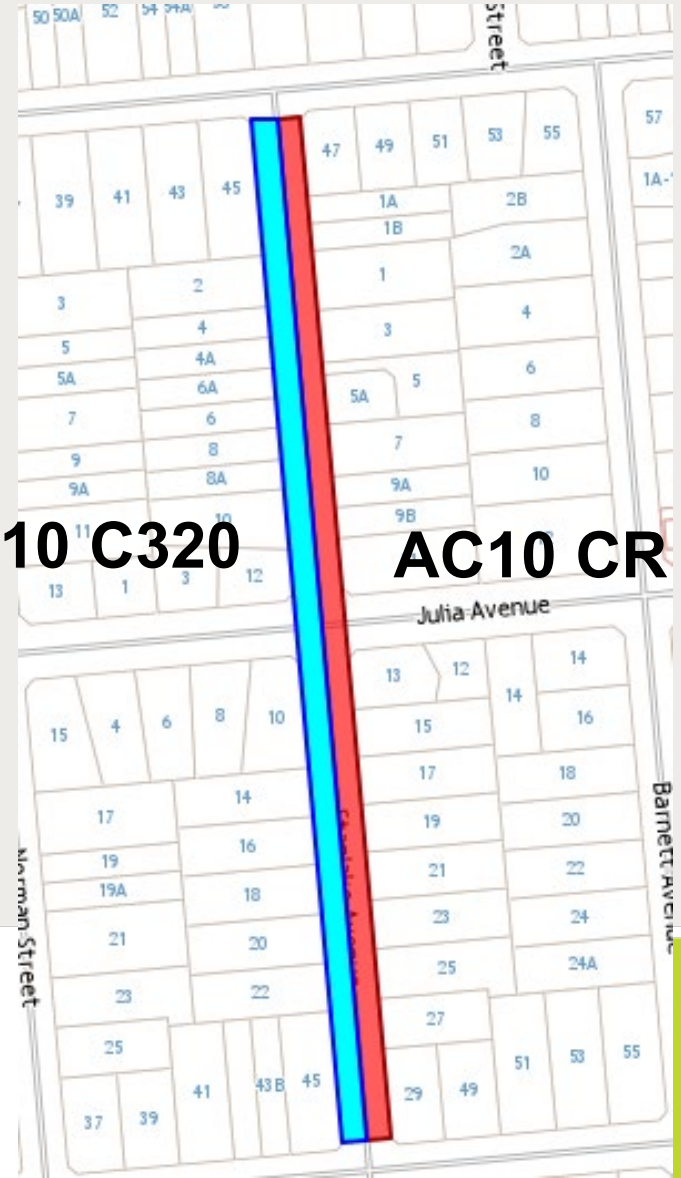

So what does it look like when laid?

Lab results of mix

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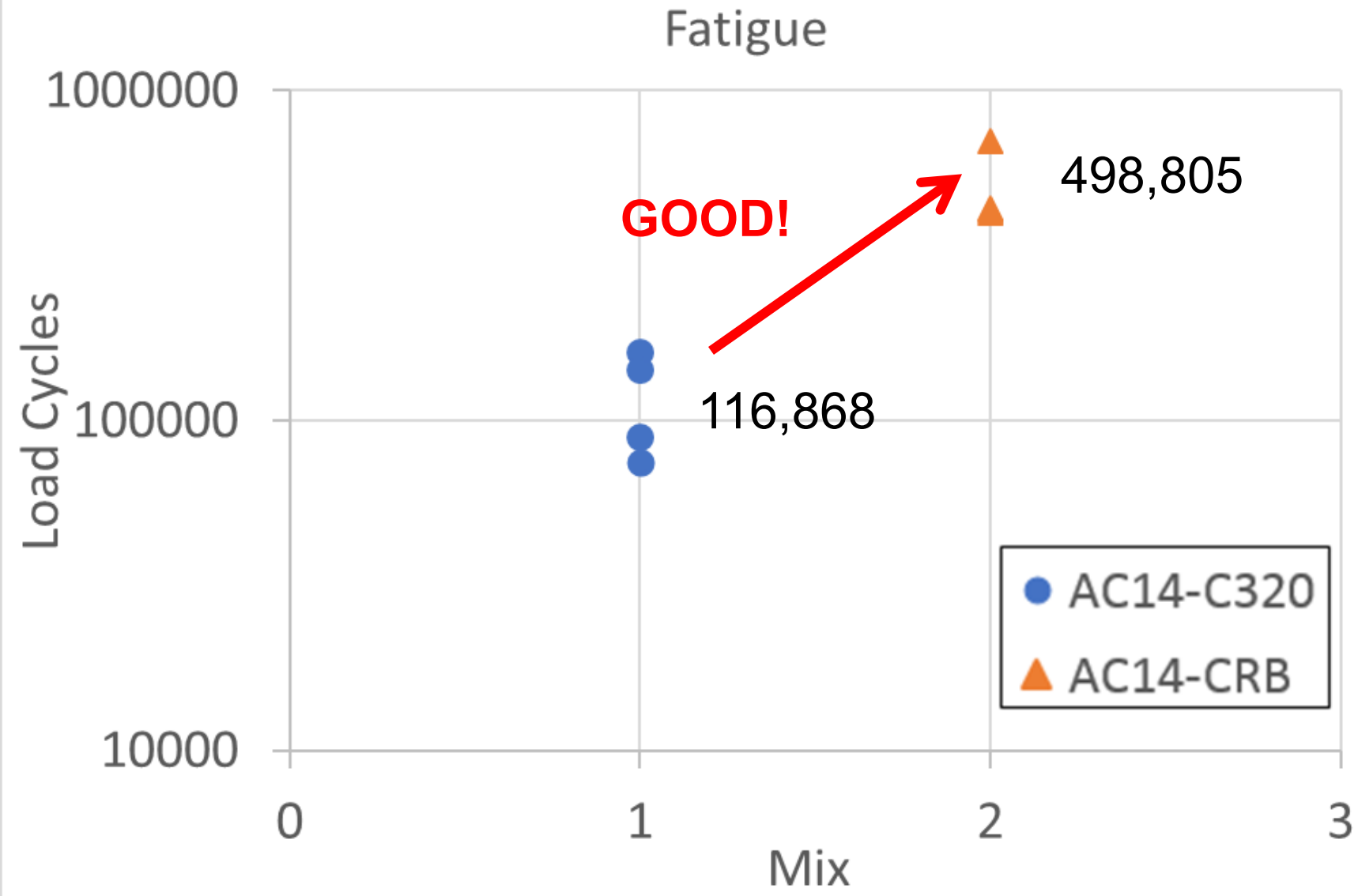
- Fatigue (cycles to failure)
- Moisture Sensitivity
- Wheel Tracking (rut resistance)

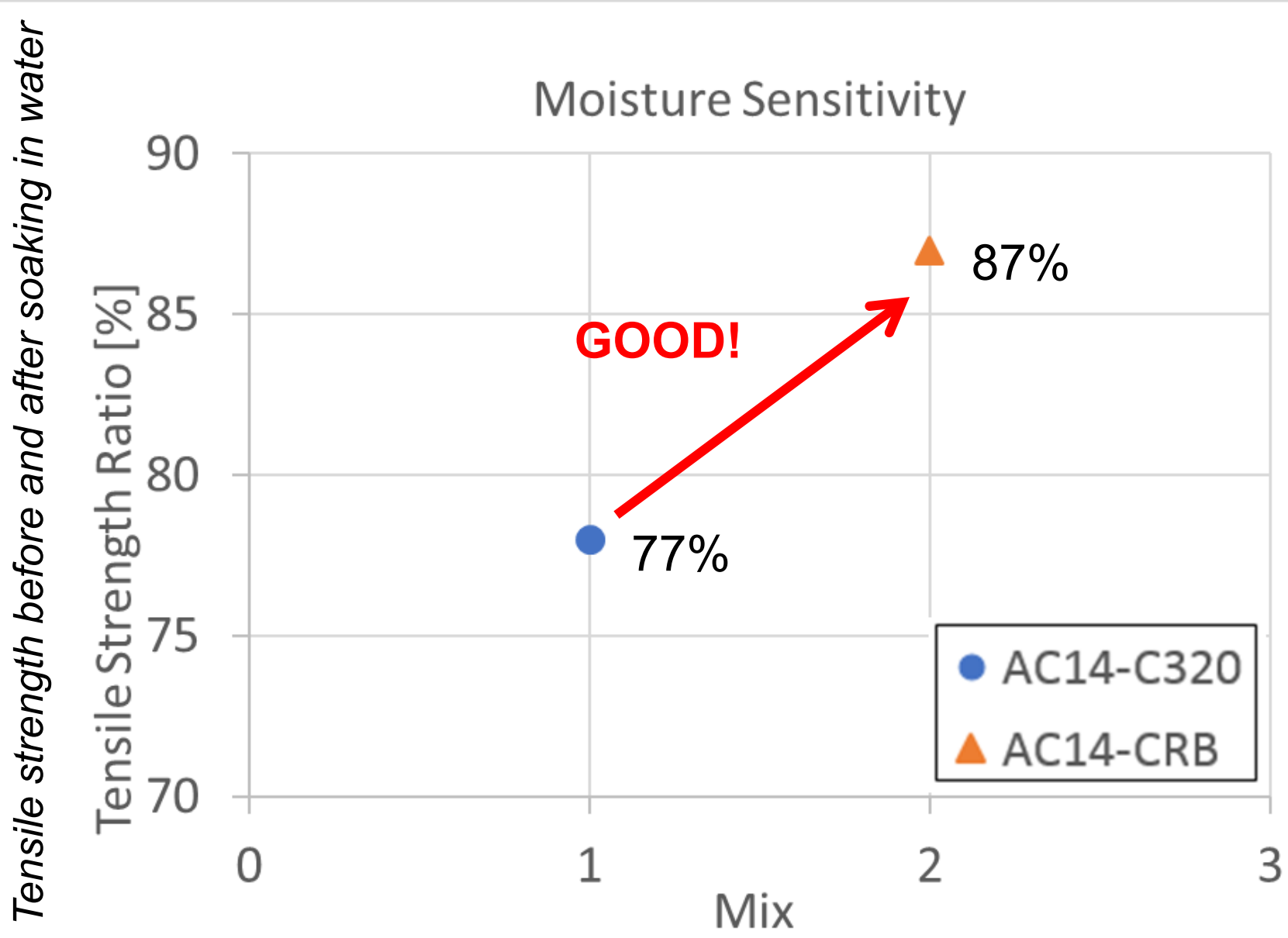
Fatigue – repetitive load until failure

(simulates repeated traffic loading)



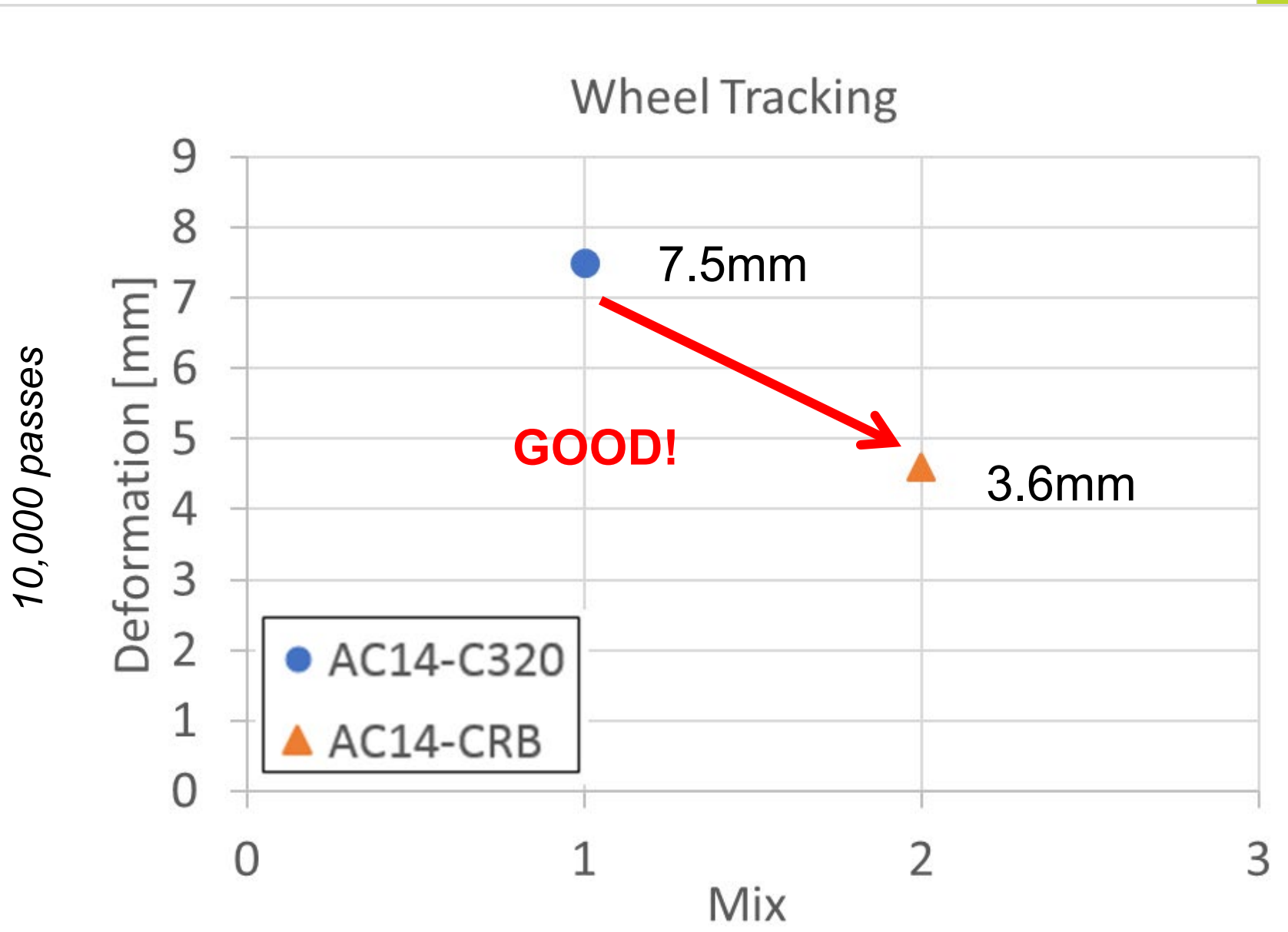
Moisture Sensitivity

(susceptibility of mix to degradation through water ingress)



Wheel Tracking

(resistance to rutting)



Field results and observations

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A lot darker/blacker (the carbon black)

Rolling with steel drum roller instead of rubber tyre roller

Air voids slightly higher than target, but this was consistent with the ‘standard’ asphalt mix (was actually lower)

Looks like a normal road!

Observations/Summation after 6 months

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- The test results would indicate better (or certainly not worse) than ‘standard’ asphalt, so why not?
- Anecdotally quieter
- Recycling – lots of investigations and research out of California as to the suitability of the product as RAP

Hasn’t collapsed or failed! Certainly no cracks yet!!

What next?

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Permeable crumb rubber asphalt!

Trial site is a carpark about 250m away that has many nearby water sensitive urban design features

Same reactive soil (class E) and intent is that by making permeable the underlying soil can retain an even moisture profile instead of wetting/drying and reduce movement


BOXING