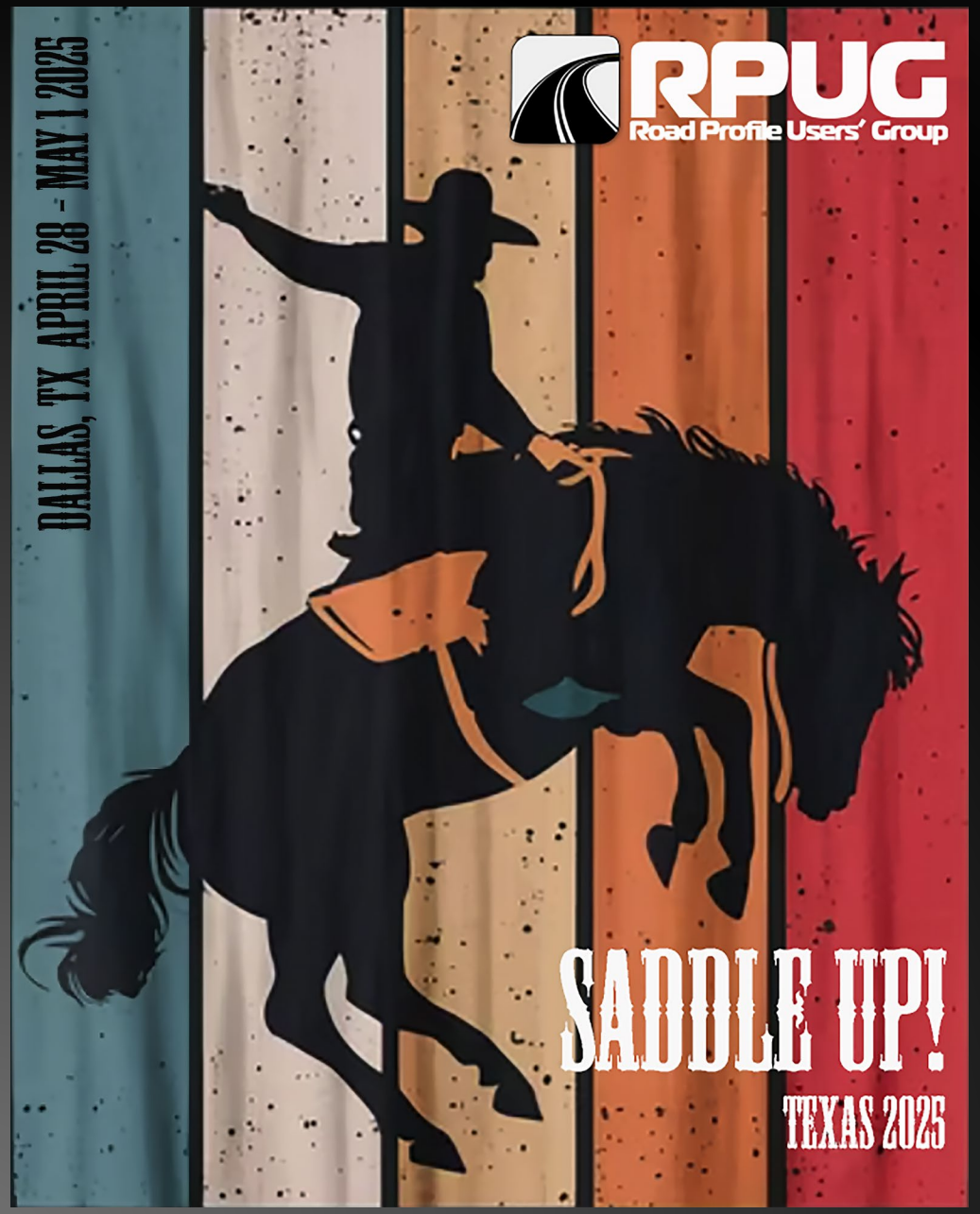

A FRACTION TOO MUCH FRICTION - NEVER

RICHARD WIX, NTRO

NATIONAL LEADER – INFRASTRUCTURE MEASUREMENT

NOT AS MANY RPUG TALKS AS STEVE KARAMIHAS

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TODAY'S THEME SONG

Don't believe in opposing factions

What we need is some positive action

*There's a fraction, too much **friction**, yeah, oh, yeah*

'Fraction to much friction' – Tim Finn

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PRESENTATION OUTLINE

- FRICTION 101
- SKID RESISTANCE MEASUREMENT IN AUSTRALIA
- COMPARISON TRIAL
- CHALLENGES

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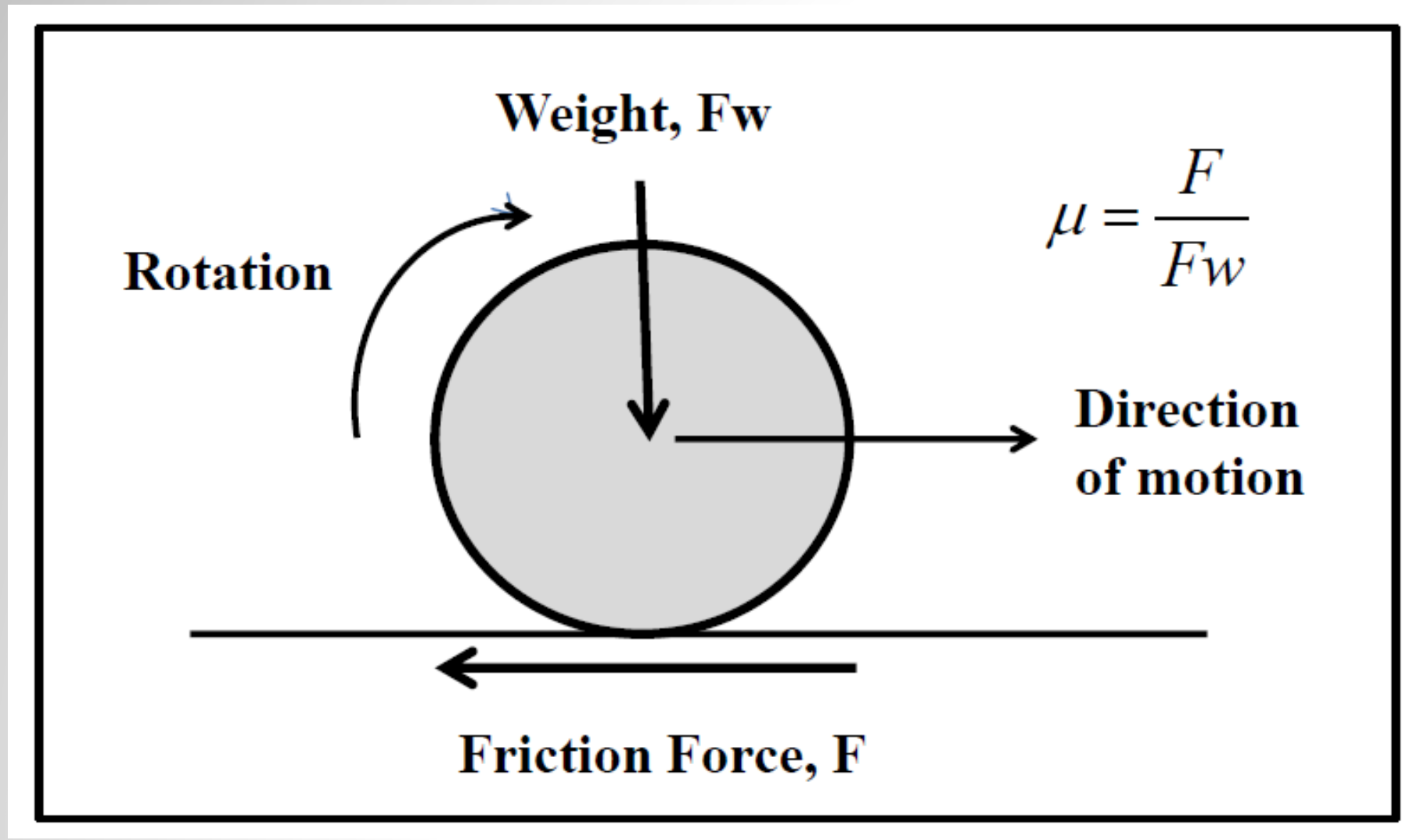
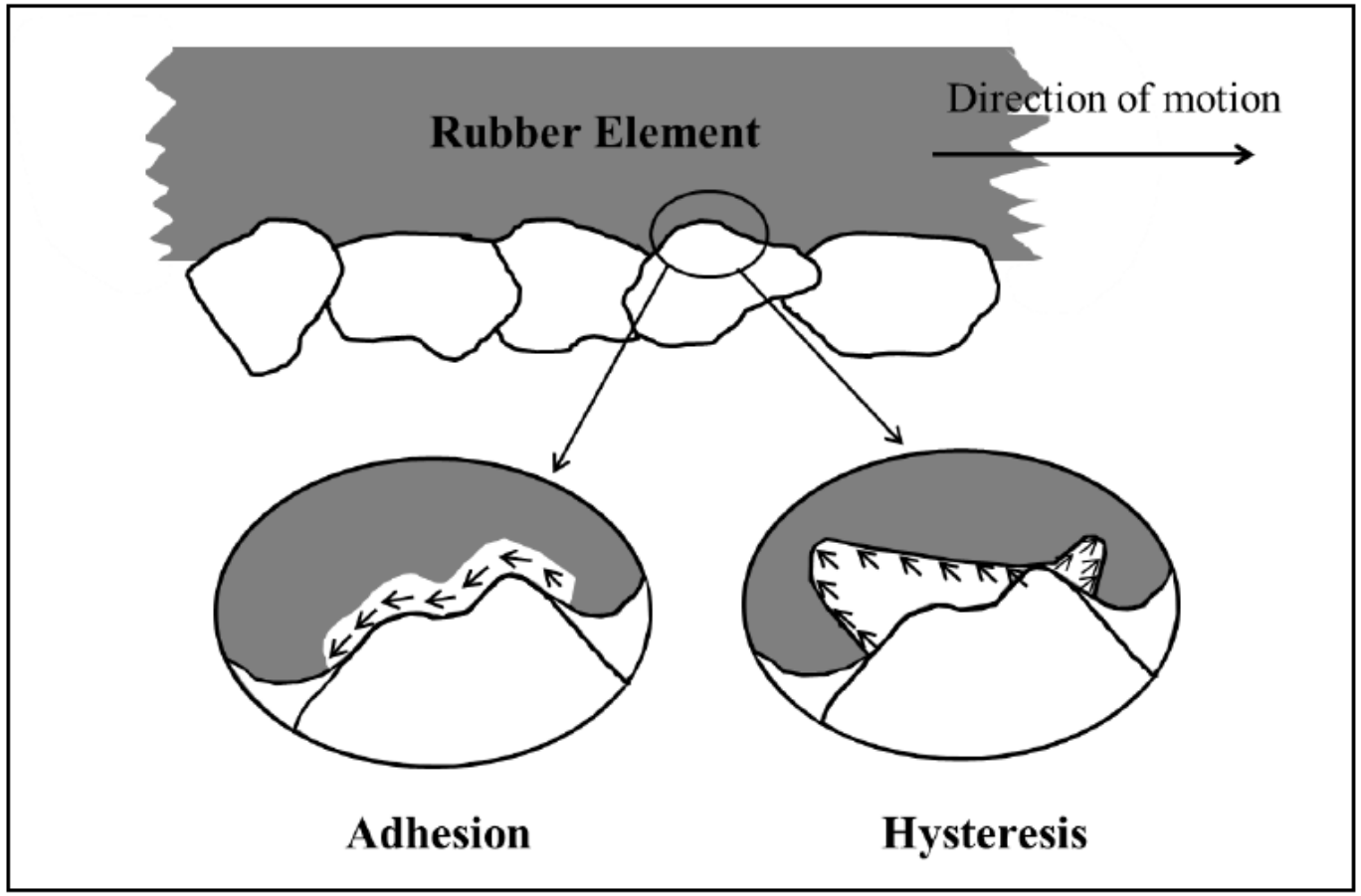
FRICTION 101- WHAT IS IT?

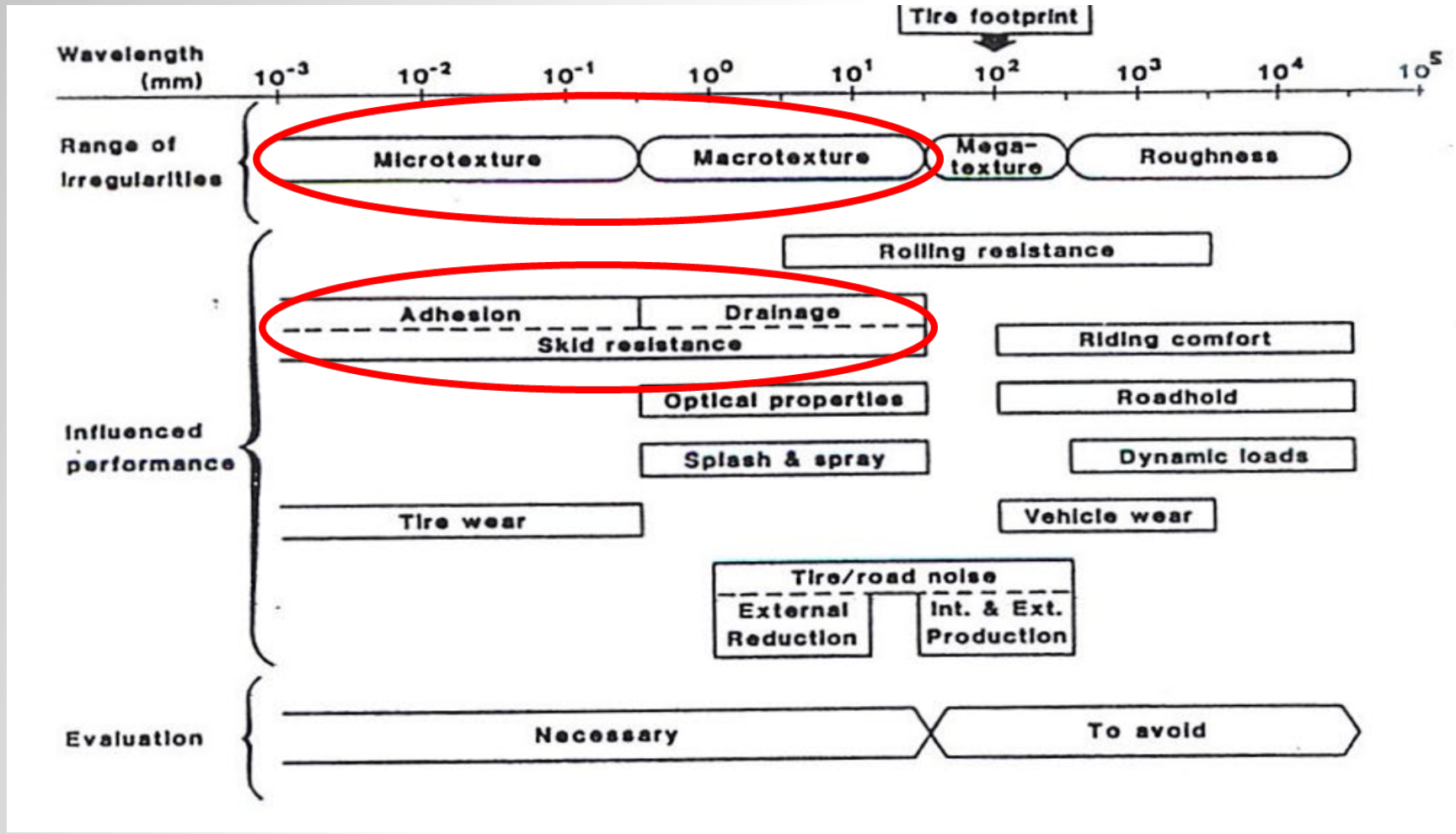


FRICTION 101- WHAT AFFECTS IT?

- ADHESION
- HYSTERESIS

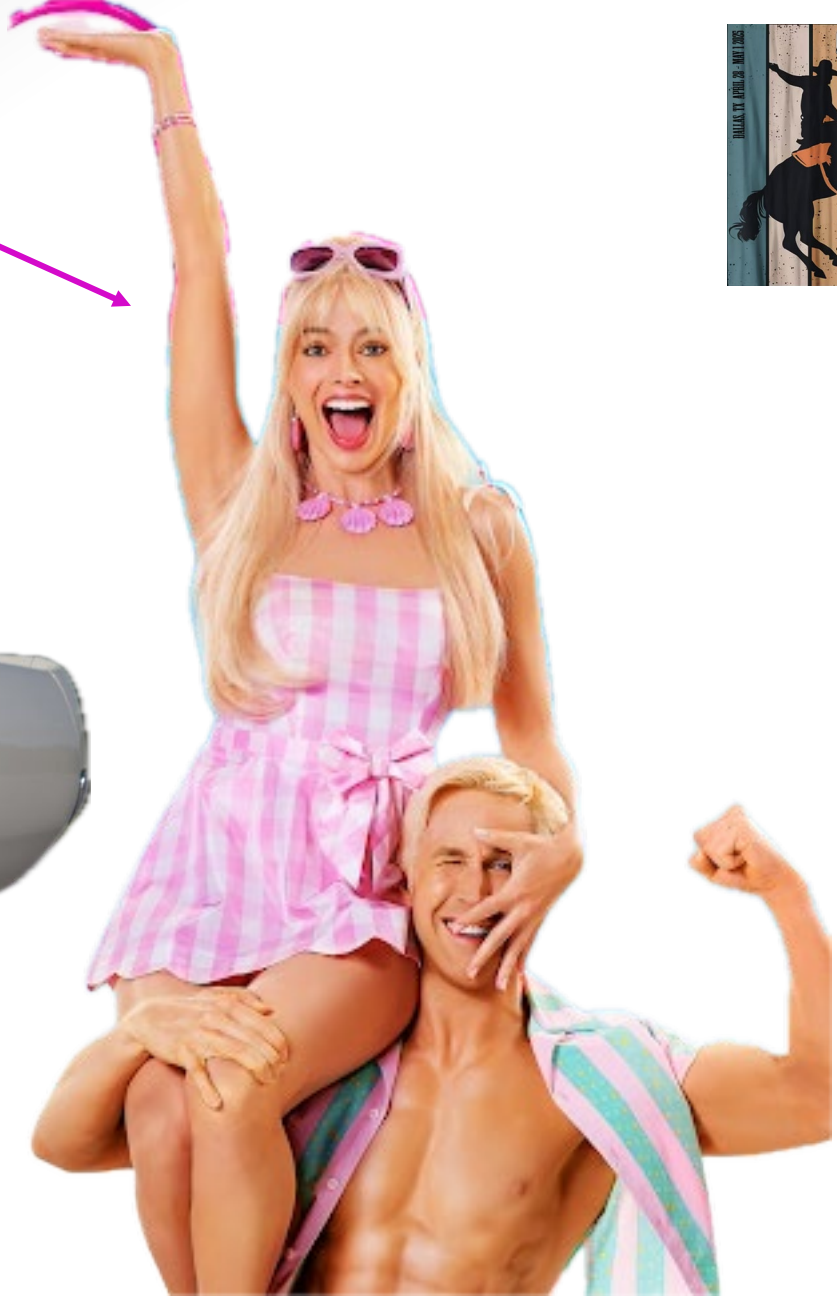


SKID RESISTANCE - WHAT AFFECTS IT?



CASE STUDY

Australian



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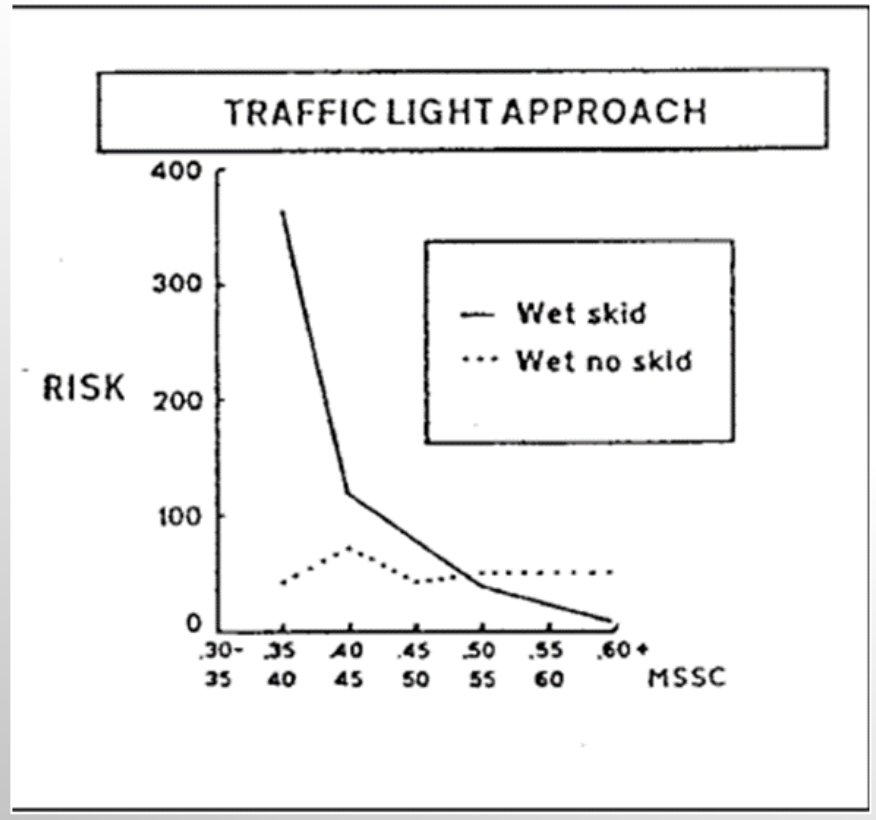
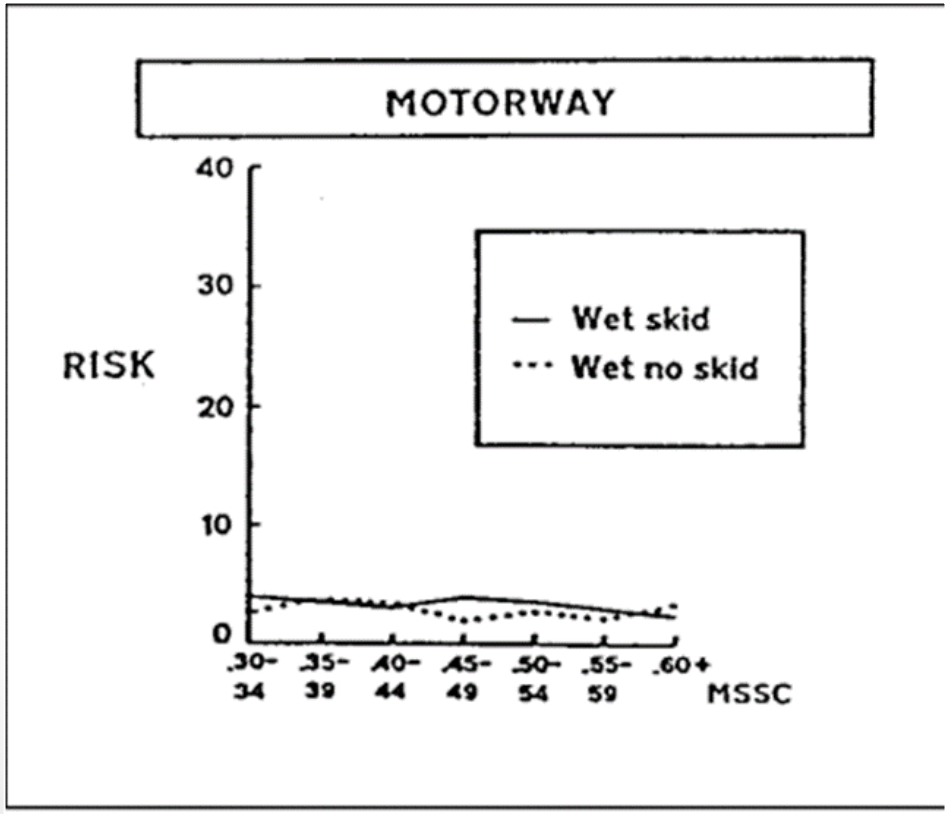
SKID RESISTANCE 101 – WHY WE MEASURE IT?





Source: Viner, Sinhal, Parry, Linking road traffic accidents with skid resistance

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SKID RESISTANCE IN ACTION

Skid demonstration

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SKID RESISTANCE MEASUREMENT IN AUSTRALIA

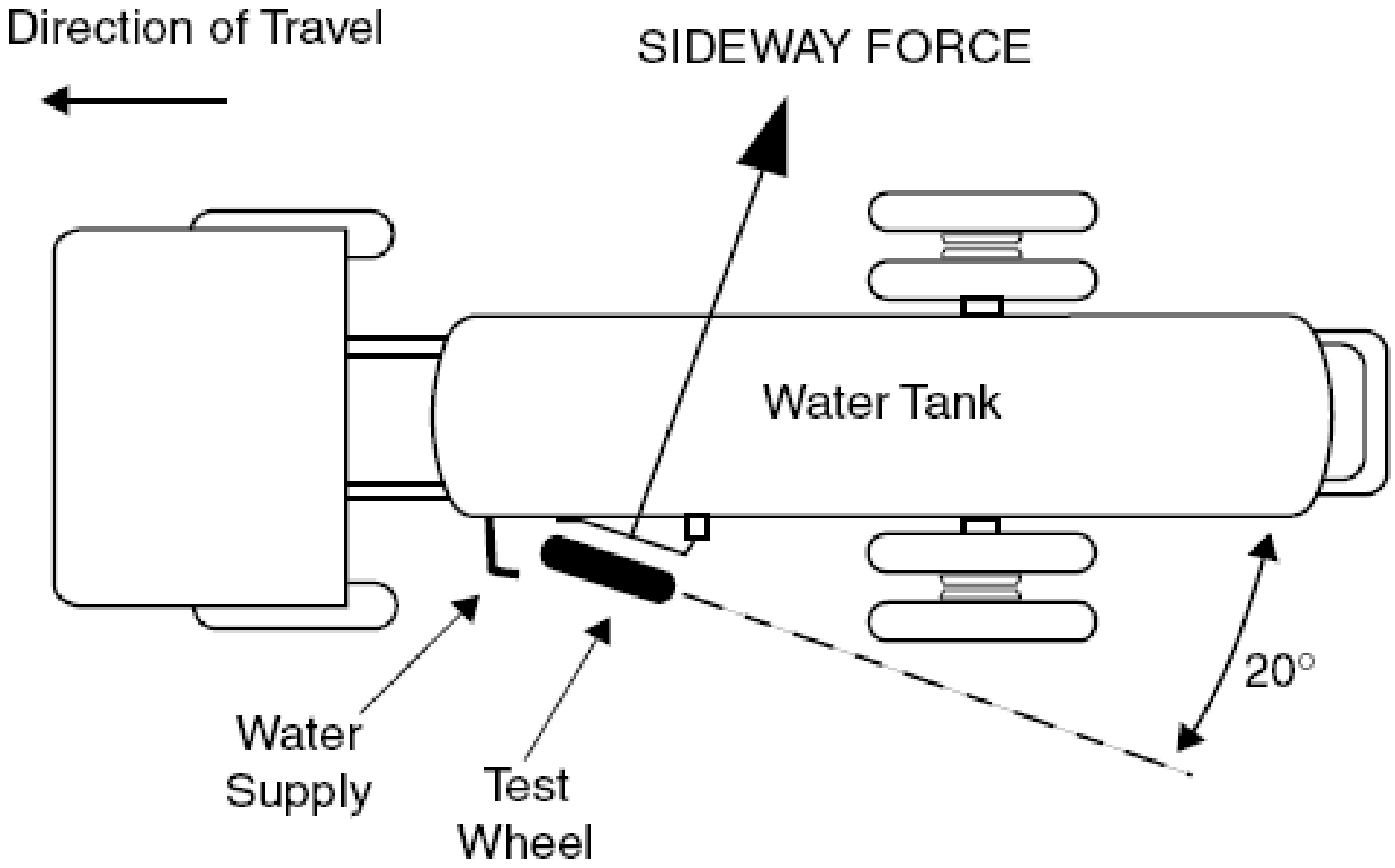
Redback Bobcat Claret Safety Boot - Tradey's Browns Plains (tradeys.com.au)

SKID RESISTANCE MEASUREMENT IN AUSTRALIA

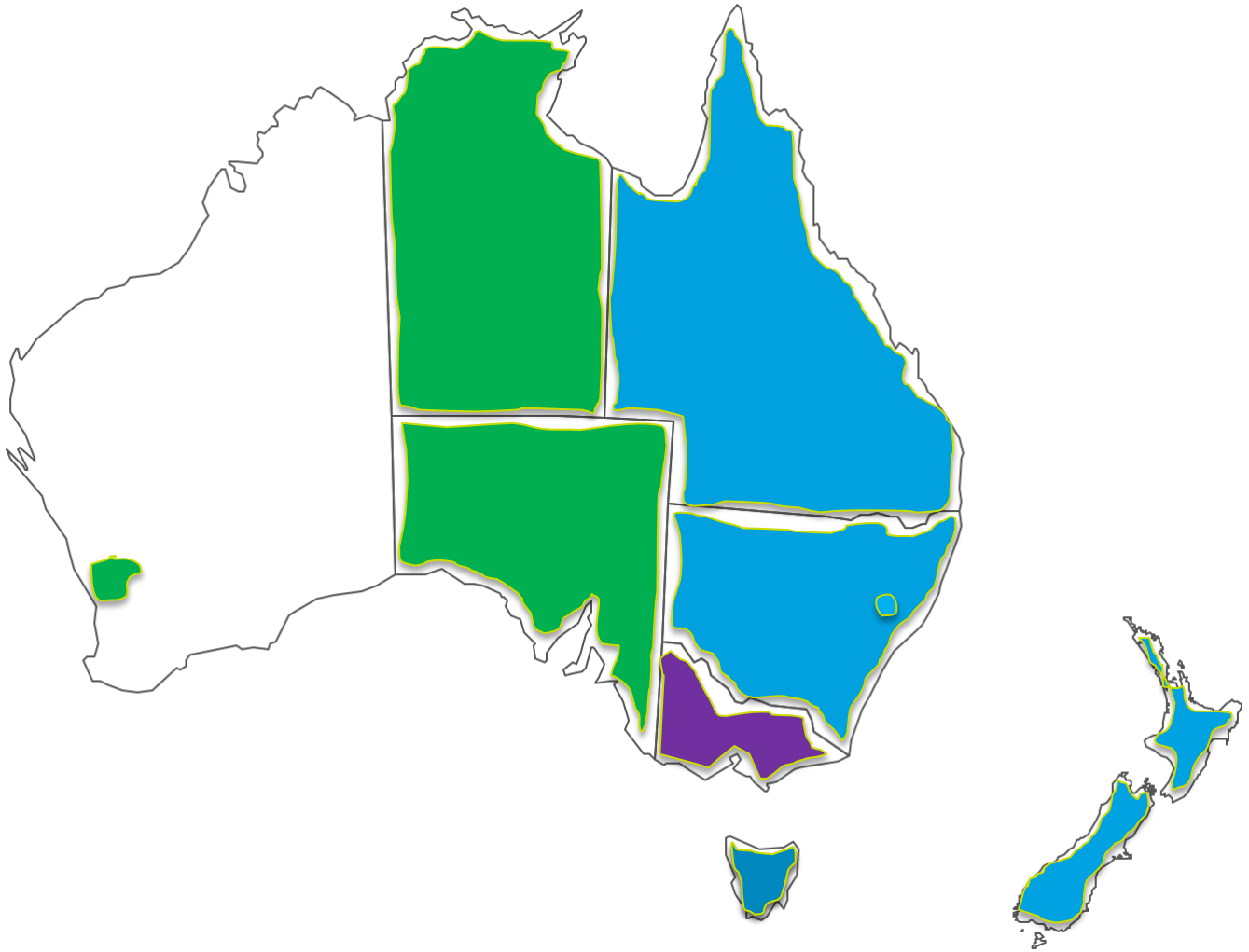
SKID MEASUREMENT IN AUSTRALIA

SKID MEASUREMENT IN AUSTRALIA

SKID MEASUREMENT IN AUSTRALIA



SKID RESISTANCE MEASUREMENT IN AUSTRALIA



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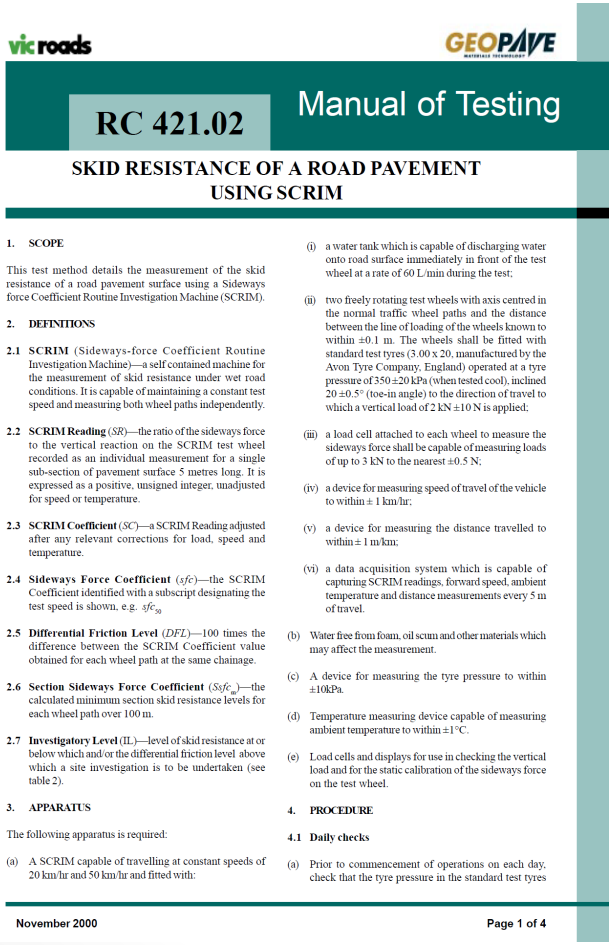
SKID RESISTANCE MEASUREMENT IN AUSTRALIA



vicroads GEOPAVE

RC 421.02 Manual of Testing

SKID RESISTANCE OF A ROAD PAVEMENT USING SCRIM

1. SCOPE

This test method details the measurement of the skid resistance of a road pavement surface using a Sideways force Coefficient Routine Investigation Machine (SCRIM).

2. DEFINITIONS

2.1 SCRIM (Sideways-force Coefficient Routine Investigation Machine)—a self contained machine for the measurement of skid resistance under wet road conditions. It is capable of maintaining a constant test speed and measuring both wheel paths independently.

2.2 SCRIM Reading (*SR*)—the ratio of the sideways force to the vertical reaction on the SCRIM test wheel recorded as an individual measurement for a single sub-section of pavement surface 5 metres long. It is expressed as a positive, unsigned integer, unadjusted for speed or temperature.

2.3 SCRIM Coefficient (*SC*)—a SCRIM Reading adjusted after any relevant corrections for load, speed and temperature.

2.4 Sideways Force Coefficient (*sfc*)—the SCRIM Coefficient identified with a subscript designating the test speed is shown, e.g. sfc_{50}

2.5 Differential Friction Level (*DFL*)—100 times the difference between the SCRIM Coefficient value obtained for each wheel path at the same chainage.

2.6 Section Sideways Force Coefficient ($Ssfc_m$)—the calculated minimum section skid resistance levels for each wheel path over 100 m.

2.7 Investigatory Level (IL)—level of skid resistance at or below which and/or the differential friction level above which a site investigation is to be undertaken (see table 2).

3. APPARATUS

The following apparatus is required:

(a) A SCRIM capable of travelling at constant speeds of 20 km/hr and 50 km/hr and fitted with:

(i) a water tank which is capable of discharging water onto road surface immediately in front of the test wheel at a rate of 60 L/min during the test;

(ii) two freely rotating test wheels with axis centred in the normal traffic wheel paths and the distance between the line of loading of the wheels known to within ±0.1 m. The wheels shall be fitted with standard test tyres (3.00 x 20, manufactured by the Avon Tyre Company, England) operated at a tyre pressure of 350 ±20 kPa (when tested cool), inclined 20 ±0.5° (toe-in angle) to the direction of travel to which a vertical load of 2 kN ±10 N is applied;

(iii) a load cell attached to each wheel to measure the sideways force shall be capable of measuring loads of up to 3 kN to the nearest ±0.5 N;

(iv) a device for measuring speed of travel of the vehicle to within ± 1 km/hr;

(v) a device for measuring the distance travelled to within ± 1 m/km;

(vi) a data acquisition system which is capable of capturing SCRIM readings, forward speed, ambient temperature and distance measurements every 5 m of travel.

(b) Water free from foam, oil scum and other materials which may affect the measurement.

(c) A device for measuring the tyre pressure to within ±10kPa.

(d) Temperature measuring device capable of measuring ambient temperature to within ±1°C.

(e) Load cells and displays for use in checking the vertical load and for the static calibration of the sideways force on the test wheel.

4. PROCEDURE

4.1 Daily checks

(a) Prior to commencement of operations on each day, check that the tyre pressure in the standard test tyres

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https://austroads.gov.au/

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INVESTIGATORY LEVELS

- APPLY TEMPERATURE AND SPEED CORRECTION
- CONSIDER DIFFERENTIAL SKID READINGS
- INVESTIGATORY LEVELS ARE BASED ON THE MINIMUM OF THE FOUR POINT ROLLING AVERAGE SKID RESISTANCE FOR EACH 100 METRE SECTION.

TABLE 1 – Investigatory Levels for Skid Resistance

Site Category	Site Description	Investigatory Levels of SFC_{50} at 50km/hr						
		0.30	0.35	0.40	0.45	0.50	0.55	0.60
1	• Signalised intersections • Pedestrian/school crossings • Railway level crossings • Roundabout and approaches	INVESTIGATION						
2	• Curves with tight radius ≤ 250m • Gradients ≥ 5% and ≥50m long • Freeway, highway; on and off ramps	ADVISED						
3	• Intersections							
4	• Manoeuvre-free areas of undivided roads							
5	• Manoeuvre-free areas of divided roads							

Site Category	Site Description	Investigatory Levels of SFC_{20} at 20km/hr						
		0.30	0.35	0.40	0.45	0.50	0.55	0.60
6	• Curves with radius < 100m	INVESTIGATION						
7	• Roundabout and approaches	ADVISED						

Key To Thresholds At Or Below Which Investigation Is Advised

Roads with less than 2,500 vehicles per lane per day

Roads with more than 2,500 vehicles per lane per day

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THE TRIAL - PURPOSE

- THE AIM OF THE FIELD TRIAL WAS TO DETERMINE THE SKID RESISTANCE MEASUREMENT CORRELATION BETWEEN THE 3 SFC DEVICES CURRENTLY OPERATING IN AUSTRALIA.

NSW GOVERNMENT | Transport for NSW

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THE TRIAL – THE VEHICLES

THE ELDER STATESMAN

VICTORIA State Government | Department of Transport and Planning

- PURCHASED IN 1970 BY CRB
- FIRST DUAL WHEEL PATH SYSTEM

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THE YOUNGER BROTHER

NSW GOVERNMENT Transport for NSW

- ORIGINAL PURCHASED IN 1970S
- SECOND SYSTEM COMMISSIONED IN 1990S

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THE NEW KID ON THE BLOCK

- iSSAVe
- Built under licence to TRL
- Commissioned in 2018

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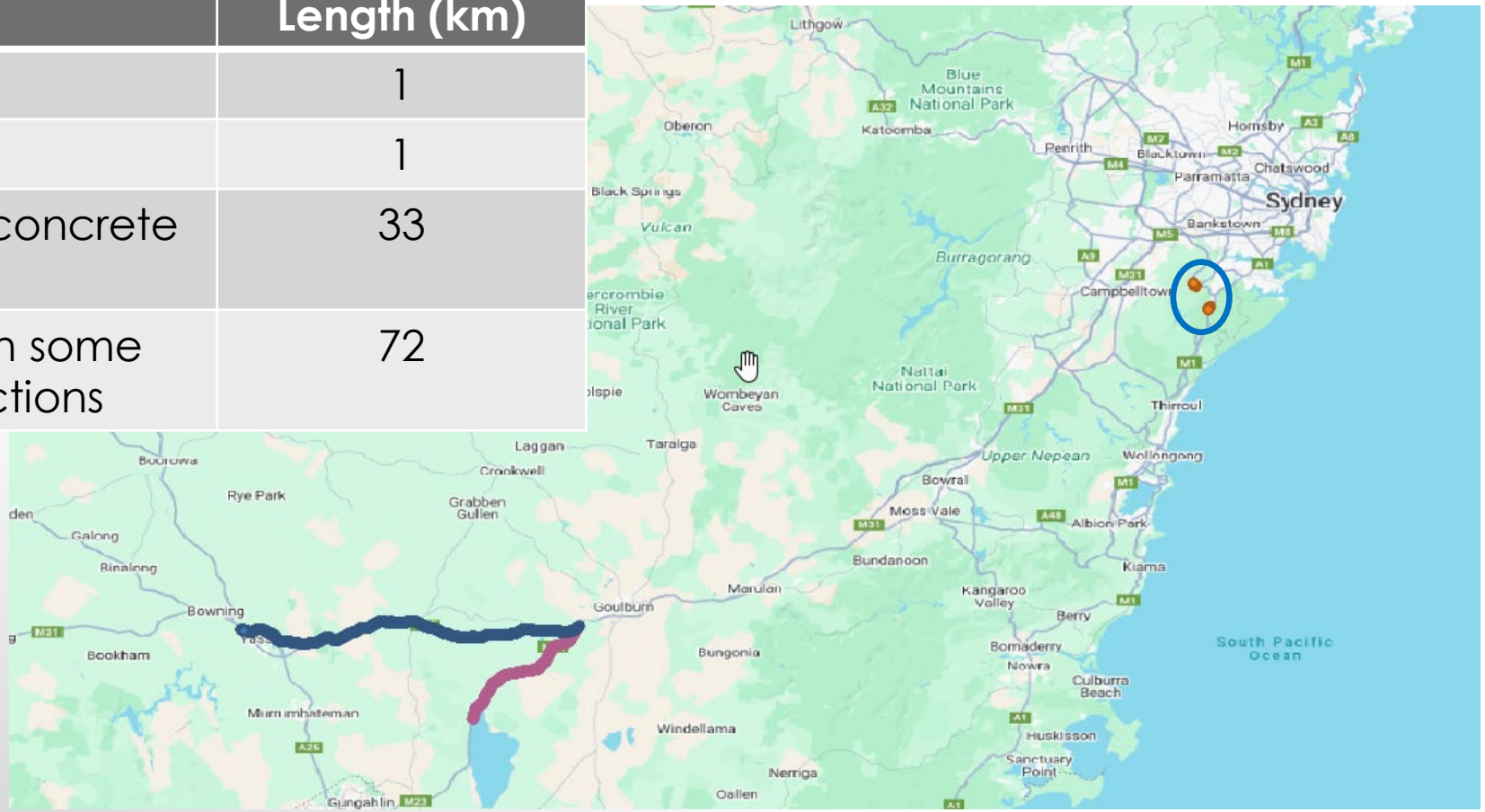
THE TRIAL - SITES

Site	Surface type	Length (km)
Heathcote Road	Spray seal	1
Princes Highway	Asphalt	1
Federal Highway	Asphalt with concrete sections	33
Hume Highway	Concrete with some spray seal sections	72



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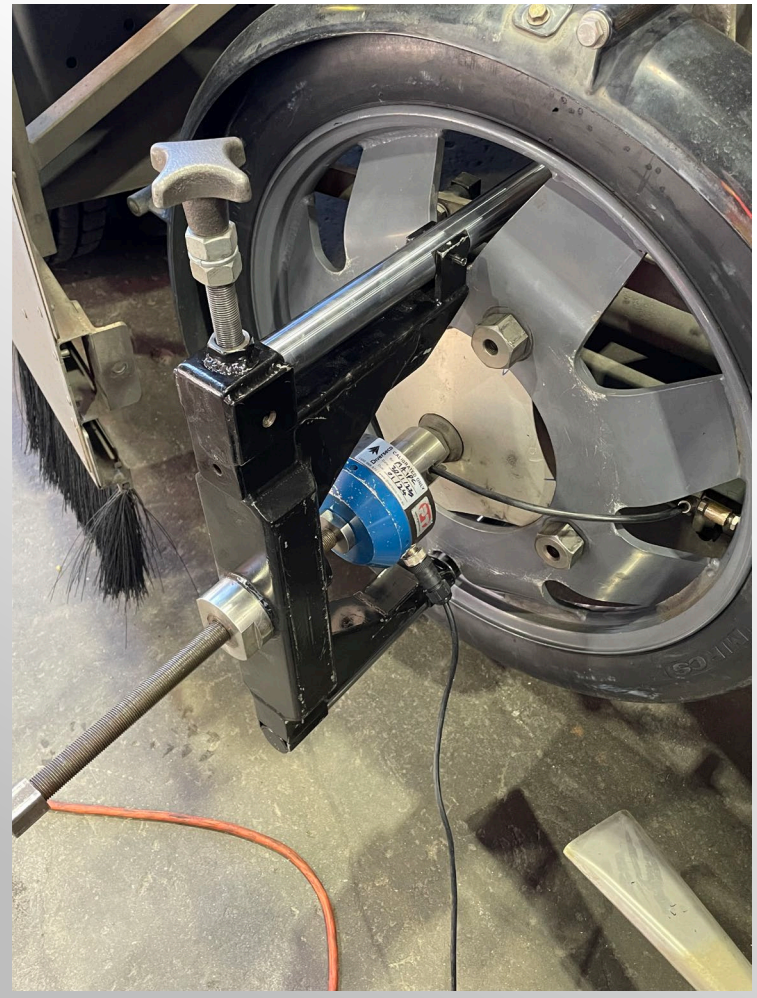
THE TRIAL - CALIBRATION



THE TRIAL – METHODOLOGY

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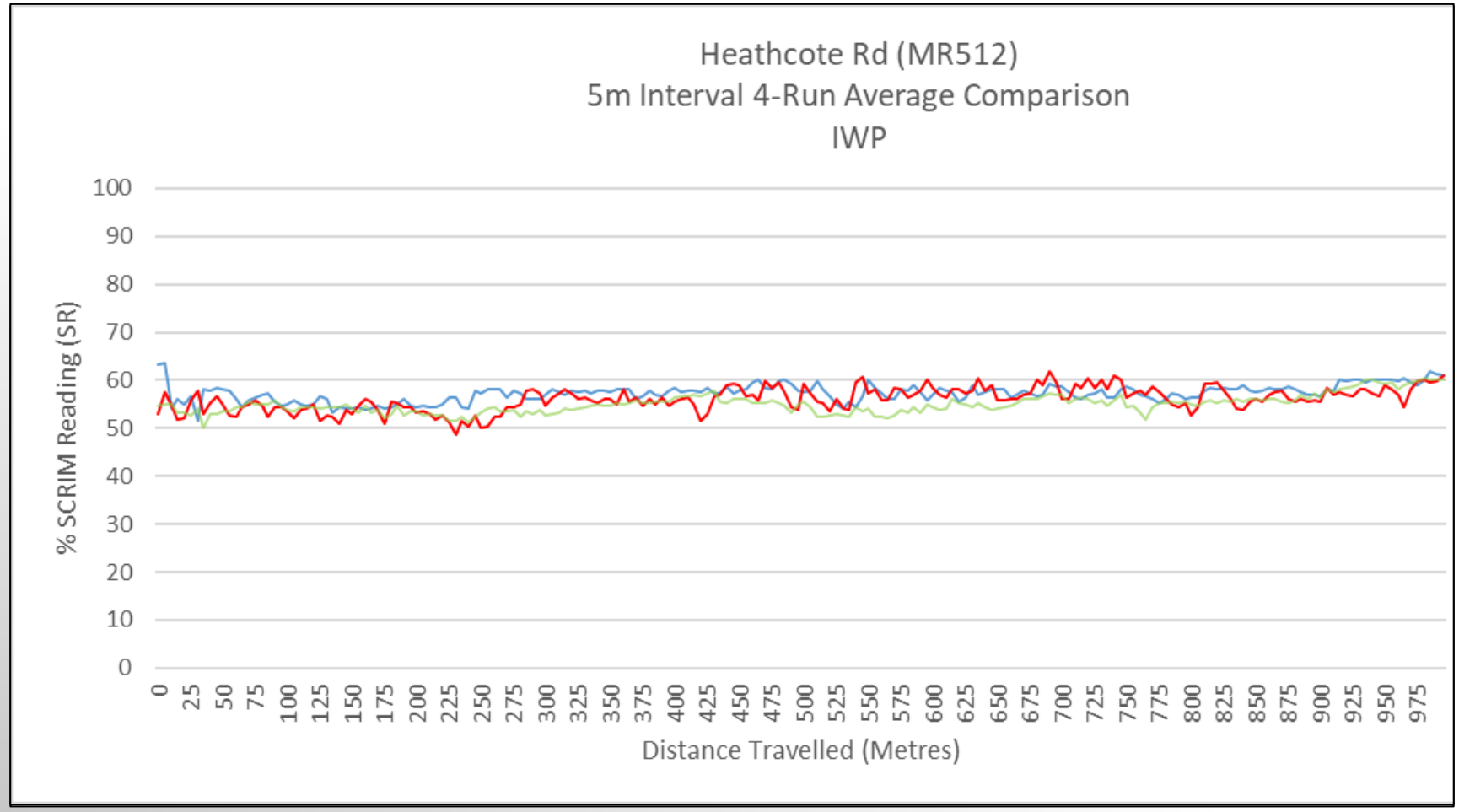
THE TRIAL – HEATHCOTE ROAD



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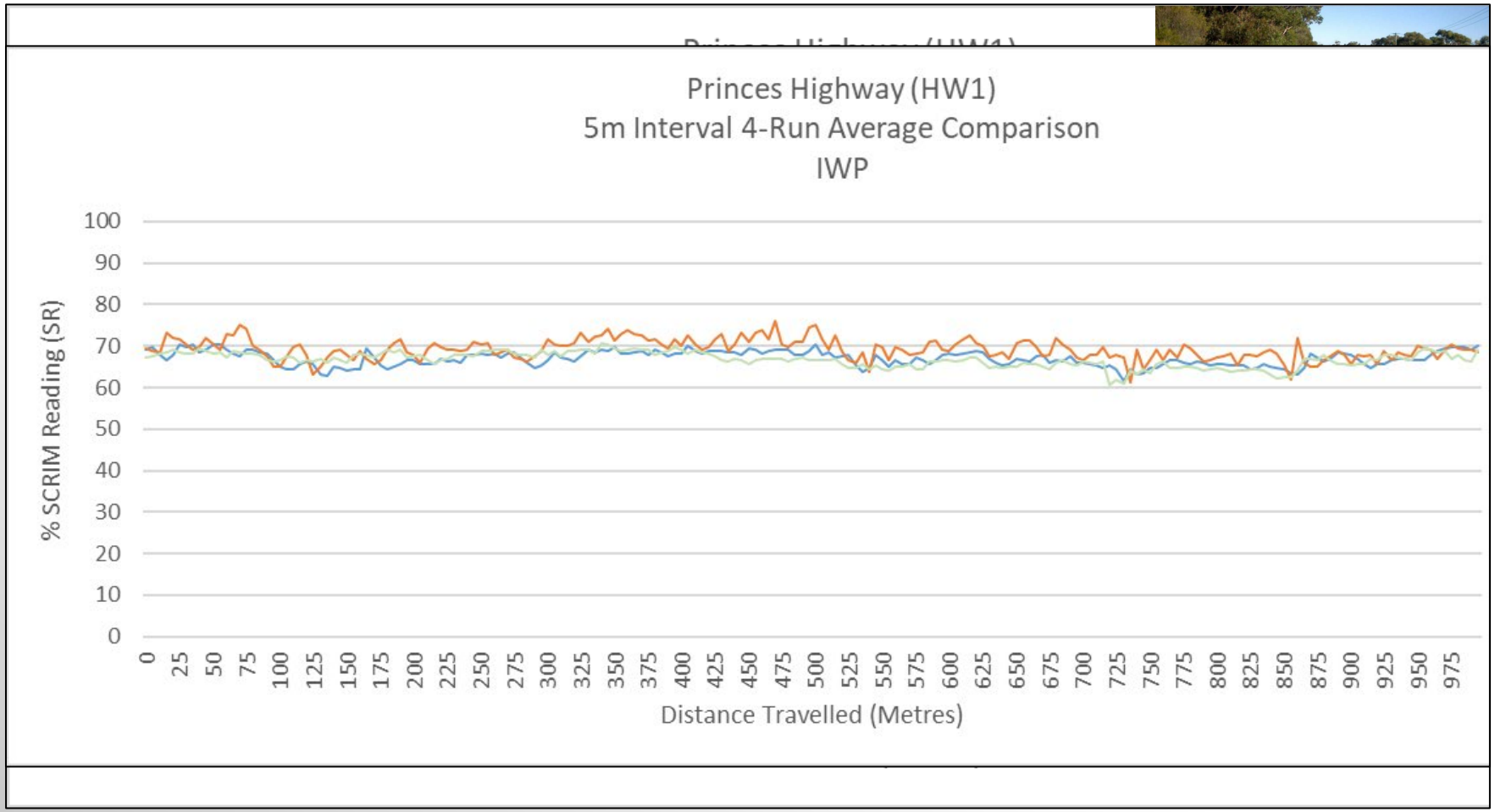
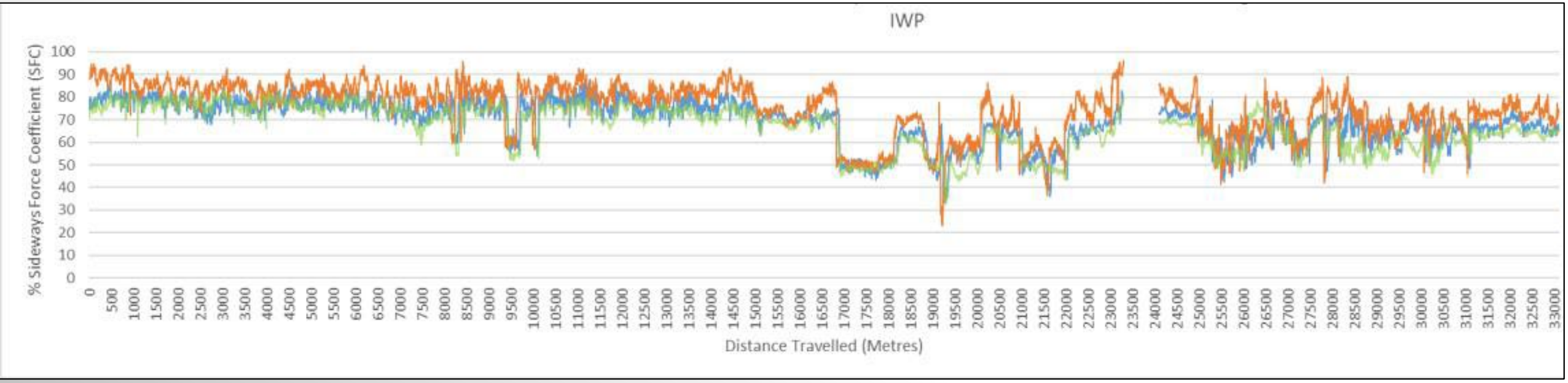
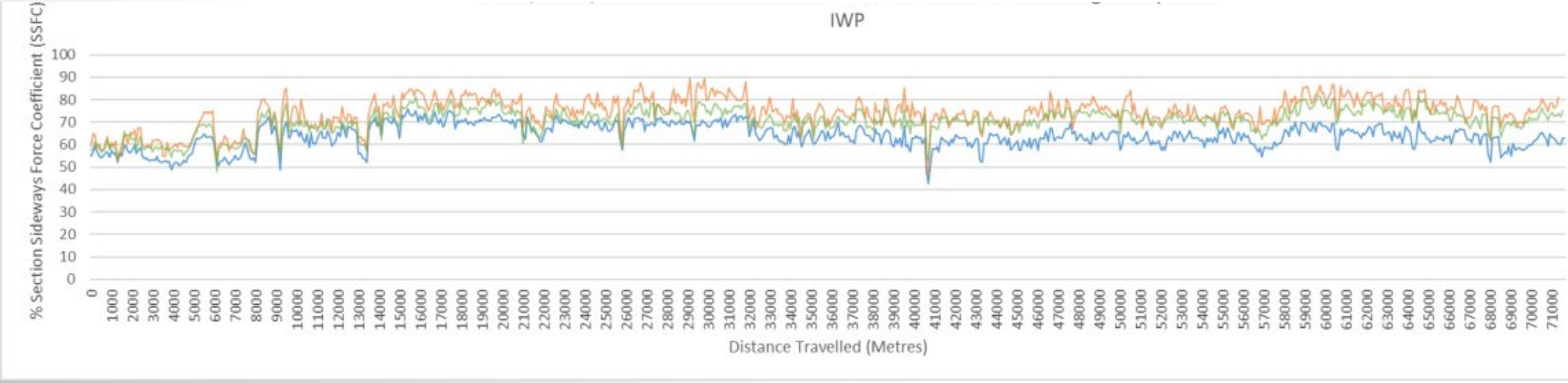
THE TRIAL – PRINCES HIGHWAY



THE TRIAL – FEDERAL HIGHWAY



THE TRIAL – HUME HIGHWAY



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TAKE AWAYS

- THE EXPERIMENTAL METHOD AND SURVEY SITE SELECTION ENABLED EVALUATION OF EACH SFC DEVICE.
- EACH OF THE 3 SFC DEVICES HAVE THE CAPABILITY TO REPORT REPEATABLE SFC VALUES FOR SITE-SPECIFIC AND NETWORK TESTING.
- ONE OF THE SFC DEVICES PRODUCED DISPARATE SFC READINGS DUE TO AN INSTRUMENTATION FAULT.

CHALLENGES

I love a sunburnt country,
A land of sweeping plains,
Of ragged mountain ranges,
Of droughts and flooding rains.

- **My Country, Dorothea Mackellar**

THANK YOU

TRL SFC Tester, 1948

Richard Wix
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