CONTRACT REPORT

Pre-Construction Road Condition Report for WestConnex M5N

Project No: PSS17265

by [redacted]

for WestConnex M5N

date July 2017

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PRE-CONSTRUCTION ROAD CONDITION REPORT FOR WESTCONNEX M5N

SUMMARY

ARRB Group was commissioned by WestConnex M5N (CPB Contractors Pty Limited, Dragados Australia Pty Ltd, and Samsung C&T Corporation Joint Venture) to survey and assess the current condition of the nominated roads associated with the construction of the WestConnex New M5 Main Works project.

Pavement surface condition survey of the selected road sections of Bayside Council's network was undertaken by ARRB in July 2017 to collect surface condition distresses including rut depth, roughness, texture depth and cracking.

The scope of the report includes:

collection and processing of pavement condition data into various data categories including roughness (IRI m/km), rut depth (mm), texture depth (mm) and cracking (% area).

- preparation of a report evaluating the overall condition of each of the nominated roads (by direction and lane) involved in the Bayside Council study area.

Condition assessments presented are based on current industry practices for the purpose of dilapidation rather than a customised local condition assessment. It should be noted that the condition statement could vary depending on the definition. See Section 1.3 for details.

Condition assessments (based on current industry standards) are presented based on the average condition of road sections.

Bayside Council

Condition assessment based on current industry standards, presented utilising the average condition of road sections under Bayside Council.

Road Section	IRI Group	Rut depth Group	Texture depth Group	Cracking Group
Airport Drive _P_1	Good	Good	Fair	Very good
Airport Drive _P_2	Good	Good	Fair	Good
Airport Drive _P_3	Good	Good	Fair	Good
Carpark Entry Rd_C_1	Fair	Very good	Fair	Very good
Carpark Entry Rd_C_2	Fair	Very good	Good	Very good
Carpark Entry Rd_P_1	Fair	Very good	Good	Very good
Carpark Entry Rd_P_2	Fair	Good	Good	Very good

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1 INTRODUCTION

1.1 General

ARRB was commissioned by WestConnex M5N (CPB Contractors Pty Limited, Dragados Australia Pty Ltd, and Samsung C&T Corporation Joint Venture) to survey and assess the current condition of the nominated roads associated with the construction of the WestConnex New M5 Main Works project.

Pavement surface condition survey of the selected road sections of Bayside Council's network was undertaken by ARRB in July 2017 to collect surface condition distresses including rut depth, roughness, texture depth and cracking. The surveyed sections have been presented in Figure 1.1.

Figure 1.1: Surveyed road section Bayside Council (Airport Drive, Car Park Entry Road)

The report summarises the current surface condition of the affected road sections by lane. The following sections address road conditions for Bayside Council.

1.2 Condition Survey

ARRB used Hawkeye 2000 survey vehicle (Figure 1.2) to capture surface condition data of the road pavement network including:

- rut depth (inner, outer and lane)
- roughness (IRI, NAASRA)
- surface texture including sand patch texture depth (SPTD) for outer and between wheel paths.
- surface condition including cracking data and other surface defects.

Figure 1.2: Network survey vehicle (NSV)

1.3 Assumptions for Levels of Service

To help communicate between engineers and management teams, condition data is further grouped into “Very Good”, “Good”, “Fair”, “Poor”, and “Very poor” based on current industry practices, see Table 1.1.

Table 1.1: Current industry Level of services

Class name	Very Good	Good	Fair	Poor	Very poor
Rut depth (mm) range	0–2.5	2.5–5	5–10	10–15	>15
Roughness (IRI) range	0–1.5	1.5–3.0	3.0–4.2	4.2–5.33	>5.33
Texture range (mm)	>1.2	1.2–0.8	0.8–0.4	0.4–0.2	0.2–0
Cracking (%) range	0–5	5-10	10-15	15-20	>20

1.4 Scope

The scope of the report is as follows:

- collection and processing of pavement condition data including roughness (IRI m/km), rut depth (mm), cracking (%) and texture depth (mm)
- preparation of a report evaluating the current condition of the road and describing outstanding defects in terms of rutting, roughness, texture depth and cracking.

2 BAYSIDE COUNCIL – CONDITION OF ROAD SECTIONS

Table 2.1 shows the average condition of roughness, rut depth, texture depth and cracking for the nominated roads of Bayside Council. Table 2.2 presents the worst condition values on each of the road sections.

Table 2.1: Average road section condition Bayside Council

Road Section	Roughness (IRI)	Rut depth (mm)	Texture depth (mm)	% Area Cracked
Airport Drive _P_1	2.29	4.88	0.68	4.79
Airport Drive _P_2	2.72	4.41	0.73	7.81
Airport Drive _P_3	2.88	4.53	0.76	6.65
Carpark Entry Rd_C_1	3.07	2.36	0.79	0.63
Carpark Entry Rd_C_2	3.79	2.35	0.85	0.14
Carpark Entry Rd_P_1	3.43	2.00	0.85	0.13
Carpark Entry Rd_P_2	3.66	2.70	0.91	0.39

Table 2.2: Worst condition within road section-Bayside Council

Road Section	Roughness (IRI)	Rut depth (mm)	Texture depth (mm)	% Area Cracked
Airport Drive _P_1	3.06	10.13	0.35	32.30
Airport Drive _P_2	5.17	9.10	0.49	29.85
Airport Drive _P_3	3.79	7.58	0.46	25.00
Carpark Entry Rd_C_1	4.35	2.80	0.77	1.25
Carpark Entry Rd_C_2	5.10	3.18	0.80	0.28
Carpark Entry Rd_P_1	4.62	2.40	0.83	0.25
Carpark Entry Rd_P_2	4.94	3.16	0.88	0.50

According to the levels of service definition (Section 1.3), the following condition statement is presented for each of the surveyed road sections (Table 2.3). It should be noted that the condition status could vary depending on the definition. The following condition categories are for the purpose of the pre and post construction comparison rather than a customised local condition assessment.

Table 2.3: Categories based on current condition-Bayside Council

Road Section	IRI Group	Rut depth Group	Texture depth Group	Cracking Group
Airport Drive _P_1	Good	Good	Fair	Very good
Airport Drive _P_2	Good	Good	Fair	Good
Airport Drive _P_3	Good	Good	Fair	Good
Carpark Entry Rd_C_1	Fair	Very good	Fair	Very good
Carpark Entry Rd_C_2	Fair	Very good	Good	Very good
Carpark Entry Rd_P_1	Fair	Very good	Good	Very good
Carpark Entry Rd_P_2	Fair	Good	Good	Very good

Each of the individual physical parameters (rut depth, roughness, texture depth and cracking) is described separately in the following sections.

2.1 Rut Depth

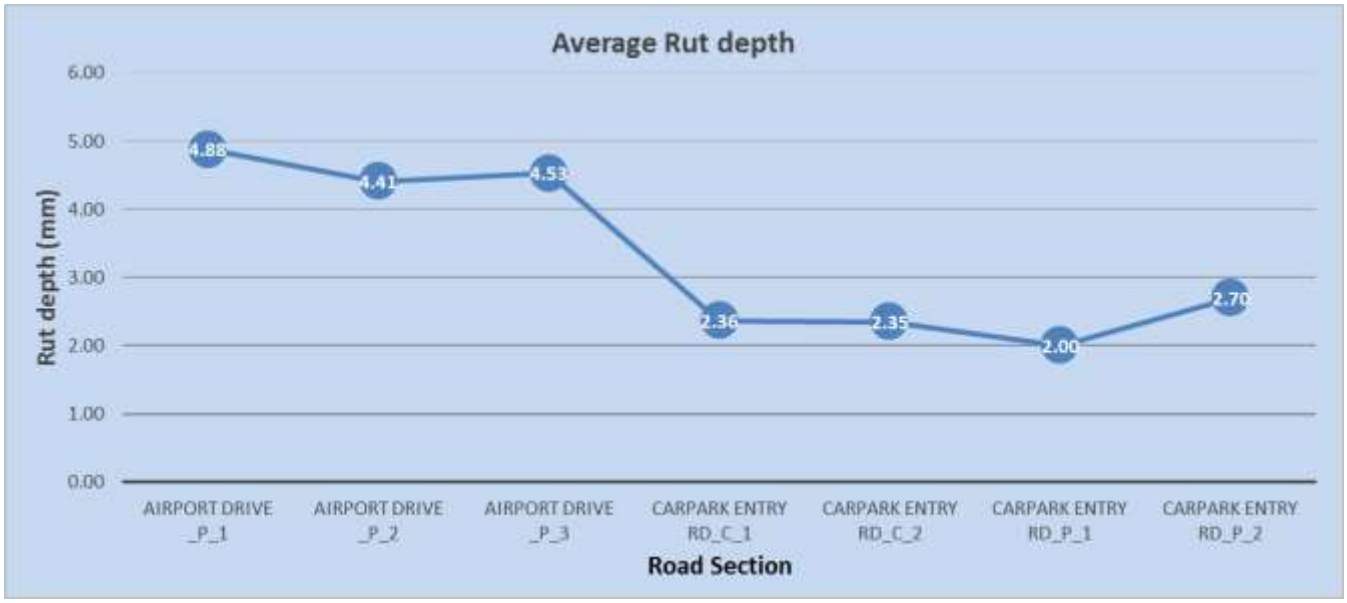
A rut is a pavement defect in the form of a longitudinal depression of the surface, usually in a wheel path (Austroads 2006a).

Rutting is considered as one of the most critical parameters on bituminous pavements in urban environments, as it reflects the deformation of the pavement. Rutting also has implications for road safety due to the potential for water ponding and subsequent loss of skid resistance. The deformation (rutting), of the asphalt may be functional or structural distress, depending on the pavement's base. Signalised intersections with asphalt pavements are particularly prone to rutting under heavy traffic.

For the current project, rutting data was collected using a 13-point laser system, which measures a 2-metre transverse profile across the lane. A full transverse profile was measured every 25 mm of longitudinal travel. The processing software allows both lane and wheel path rutting to be measured using the string line and straight edge model. Mean rut depth of *Rut Right_2mSE* and *Rut Left_2mSE* has been calculated and then averaged for each road section.

Figure 2.1 presents the average rut depth of each road section and all of the sections are in 'good' condition with average rut depth of less than 5 mm.

Figure 2.1: Average condition Rut depth Bayside Council

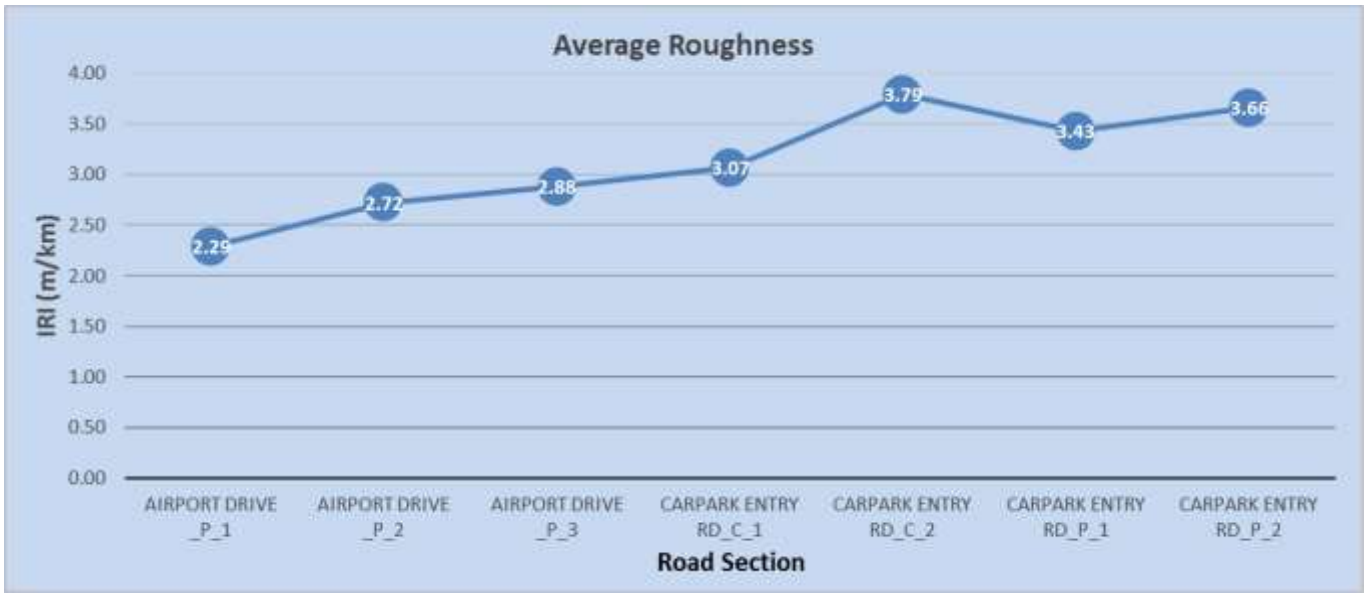


2.2 Roughness

Roughness is considered as an important indicator of driver comfort and its change is accepted as an indicator of condition deterioration. Roughness data is presented as the International Roughness Index (IRI), the average of the left and right wheel path values for the surveyed lanes. Austroads has endorsed the International Roughness Index (IRI) as the reporting unit for road roughness in Australasia (Austroads 2006b).

Figure 2.2 shows the average roughness condition of each surveyed section. Majority of the sections present roughness value in between 3-4 IRI, which is considered 'Fair' according to the assumed level of service definitions (Section 1.3).

Figure 2.2: Average condition-Roughness-Bayside Council



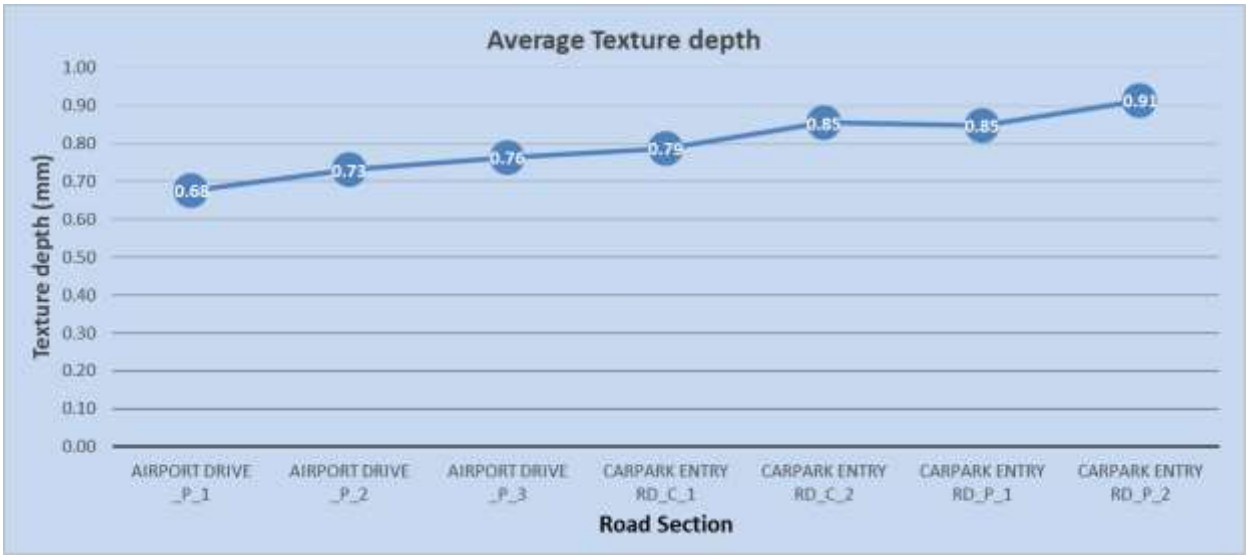
2.3 Texture Depth

Texture depth refers to the amplitude of deviations from the surface plane of the road and is influenced by the size, shape and spacing of the aggregate of the surfacing material.

Texture is an important contributor to safety, as adequate texture depth is required to maintain skid resistance, particularly under wet conditions. On bituminous surfaces, it may indicate the loss of texture or appearance of bitumen on the surface. Both the outer (where trafficking is greatest) and between wheel paths (where trafficking is minimal) were measured. It should be noted that a comparison of both could indicate texture loss, which should be monitored against future measurements to determine the rate and extent of deterioration. In this analysis, texture depth was taken from the survey data as the minimum of SPTD (mm) of the left wheel path and between wheel path.

As indicated in Figure 2.3 all of the road sections have texture depth of 0.6 mm or more, which is considered 'Fair'/ "Good" condition for texture depth.

Figure 2.3: Average condition-Texture depth-Bayside Council



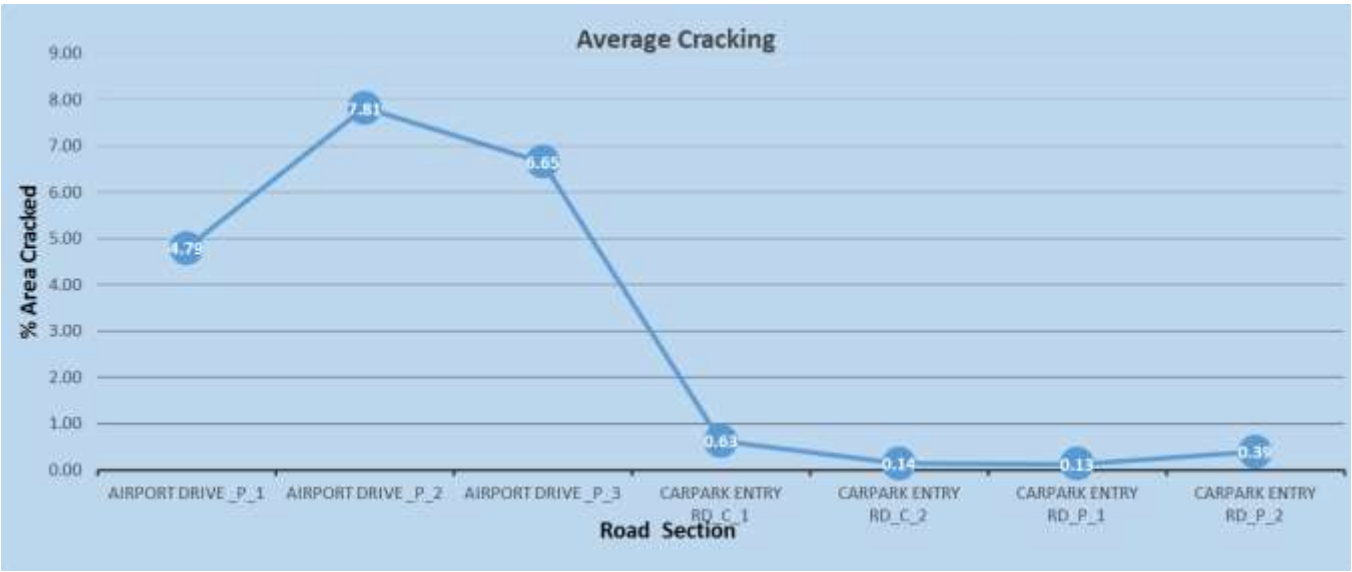
2.4 Cracking

A crack is an unplanned break or discontinuity in the integrity of the pavement surface, usually a narrow opening or partial fracture, often indicating vertical splitting of the pavement, not necessarily extending through the entire thickness of a course or pavement (Austroads 2006c). Cracks may be linear (transverse or longitudinal), interconnected (crocodile or block), or irregular, single and isolated or in groups, with varying spacing between them. Once cracking is initiated, the potential is much greater for accelerated deterioration of the pavement (Austroads 2006c).

For the current project, cracking data was classified (during data collection) as different types of cracking, their extent, severity etc. While analysing the network condition, percent of area cracked, which is an aggregation of values for all types of cracking, was used for reporting of surveyed data.

All road sections of Bayside Council have less than 10% of area cracked and it is considered as 'Good' (Figure 2.4) according to the LoS definitions used.

Figure 2.4: Average condition-Cracking-Bayside Council



3 CONCLUSIONS

ARRB Group was commissioned by WestConnex M5N (CPB Contractors Pty Limited, Dragados Australia Pty Ltd, and Samsung C&T Corporation Joint Venture) to survey and assess the current condition of the nominated roads associated with the construction of the WestConnex New M5 Main Works project.

Pavement surface condition survey of the selected road sections of Bayside Council's network was undertaken by ARRB in July 2017 to collect surface condition distresses including rut depth, roughness, texture depth and cracking.

Condition assessments (based on current industry standards) are presented based on the average condition of road sections.

3.1 Bayside Council

Condition assessment based on current industry standards, presented utilising the average condition of road sections under Bayside Council.

Table 3.1: Bayside condition assessment

Road Section	IRI Group	Rut depth Group	Texture depth Group	Cracking Group
Airport Drive _P_1	Good	Good	Fair	Very good
Airport Drive _P_2	Good	Good	Fair	Good
Airport Drive _P_3	Good	Good	Fair	Good
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Carpark Entry Rd_P_1	Fair	Very good	Good	Very good
Carpark Entry Rd_P_2	Fair	Good	Good	Very good

REFERENCES

Austroads 2006a, *Guide to Asset Management Part 5C: Rutting*, AGAM05C/07, Austroads, Sydney, NSW

Austroads 2006b, *Guide to Asset Management Part 5B: Roughness*, AGAM05B/07, Austroads, Sydney, NSW.

Austroads 2006c, *Guide to Asset Management Part 5C: Cracking*, AGAM05E/07, Austroads, Sydney, NSW.