Technical Memorandum: **TNZ TM 7003 v1**
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Network Operations Technical Memorandum No: TNZ TM 7003 v1

Subject: **Roughness Requirements for Finished Pavement Construction**

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1. Purpose

This memo details the roughness requirements to be specified for the completion of new road works. The aim is to be consistent in all Transit Regions.

It applies to all pavement rehabilitations and new road construction. The target roughness values for area wide treatments may need to be increased, as the purpose of these treatments are justified by reducing maintenance costs rather than achieving a smoother pavement.

2. Roughness Requirements

It is recommended that no 100 m moving average of lane roughness over the extent of works shall exceed a maximum of 70 NAASRA counts/km, with the target value being 60 NAASRA counts/km.

For structural asphaltic concrete or other bituminous surfacings, the maximum and target 100 m moving average lane roughness requirements are to be reduced to 60 and 50 NAASRA counts/km, respectively.

Either an inertial laser profiler or response-type roughness meter can be used for determining lane roughness over the extent of the works so long as it has been validated according to Austroads Test Method AG:AM/T002 (2006) and can output the roughness measurements at intervals of 20 m or less.

The moving average length of 100 m is to be based on roughness measurements made at 20 m intervals. Say a new seal length extends from 0 – 150 m. 100 m moving averages will be calculated starting at 0 -100 m and moving through to 20 – 120 m and finally 40 – 140 m.

No roughness measurement will be made on the remaining 10 m length at 140 – 150 m. Instead, current target deviations from a straight edge as specified in TNZ B/02 (2005),

TNZ P/09 (1975) and TNZ P/11 Notes (2003) are expected to be sufficient to control isolated bumps over this short length. This approach of specified deviations from a straight edge will also be used to control roughness on any works whose extent is less than 100m.

Notes:

1. For projects where existing surface roughness is high, a check should be made to ensure the specified 100 m moving average lane roughness values are achievable using normal construction practices by applying the following relationship from Cenek and Patrick (1991):

$$A = 0.36 \times B + 25$$

where: A is the predicted "after" NAASRA roughness
B is the measured "before" NAASRA roughness

2. If roughness is output in terms of quarter car International Roughness Index (IRI_{qc}), the lane NAASRA is determined using the following equations:

$$\text{NAASRA(counts/km)} = 26.49 \times LaneIRI_{qc} - 1.27 \quad \ldots(1)$$

$$\text{and } LaneIRI_{qc} = \frac{IRI_{qcL} + IRI_{qcR}}{2} \quad \ldots(2)$$

where: $LaneIRI_{qc}$ = lane roughness (IRI m/km)
IRI_{qcL} = roughness of left wheel path (IRI m/km)
IRI_{qcR} = roughness of right wheel path

3. A calibrated ARRB Walking Profiler (refer Austroads Test Method PAT01:2001) must be used as the reference device to resolve any issues concerning the accuracy of the lane roughness measurements.

References:

Austroads Test Method AG:AM/T002 (2006): Validation of an Inertial Laser Profilometer for Measuring Pavement Roughness (Reference Device Method)

Austroads Test Method PAT01 (2001): Determination of the International Roughness Index (IRI) using ARRB Walking Profiler

Cenek, P.D. and Patrick, J.E. (1991) Prediction of Road Roughness Progression, Central Laboratories Report 91-29301