

SPECIFICATION FOR SKID RESISTANCE INVESTIGATION AND TREATMENT SELECTION

1. SCOPE

This specification outlines the process for identifying sites where treatment to improve skid resistance may be justified.

2. GLOSSARY AND DEFINITIONS

Bleeding: The flowing of active bituminous binder onto the road surface. A bleeding binder, because it is at a low viscosity, can be tracked by vehicle tyres. Tracked binder from bleeding seals may mask the microtexture of aggregates reducing skid resistance. (See Flushing below).

British Pendulum Tester (BPT): A portable dynamic pendulum device that measures the energy absorbed by a rubber pad as it slides over a test surface.

British Pendulum Number (BPN): is the value of skid resistance obtained from the BPT, used according to TNZ T/2 Standard Test Procedure For Measurement Of Skid Resistance Using The British Pendulum Tester.

Crash Site: The site includes the area of the crash and a length at either end that may have influenced the crash.

CVD: is the flow of commercial vehicles per lane per day. In the New Zealand context a commercial vehicle is an MCV or heavier (As defined in Transfund's Project Evaluation Manual, Appendix A2.2.1).

ESC: Equilibrium SCRIM Coefficient. ESC is MSSC data smoothed for year-to-year variations. (The RAMM database for 2002 is populated with ESC data.) ESC values are defined as falling within three ranges:

- High; Values of ESC above the IL
- Medium; Values of ESC between IL and the threshold level (TL)
- Low; All values of ESC below the TL.

Flushing: A low textured road surface due to the upward migration of binder, reducing macrotexture. Flushing is inert until surface tension is broken through high pavement temperatures or tyre pick-up, when bleeding may occur. See also bleeding.

Investigatory Level (IL): This is the level of skid resistance at or below which a site investigation is to be undertaken, and the information used as a priority indicator for programming treatment. For skid resistance, the TL is currently set at 0.1 below the IL.

MSSC: Mean Summer SCRIM Coefficient (Previously called NZMSSC in RAMM). MSSC is the mean SCRIM coefficient over the summer period (when skid resistance is generally at it's lowest).

Polished Stone Value (PSV): is a measure of the level of polishing of surfacing aggregate under standard laboratory conditions. It is designed to indicate the ultimate state of polish for in situ road surfacing aggregate.

SCRIM (Sideway-force Coefficient Routine Investigation Machine): A machine which measures the skid resistance of roads under wet conditions, and is capable of testing both wheelpaths of long lengths of road at a speed of approximately 50 km/h.

The raw data from SCRIM is the ratio of the vertical force to the induced side force on the test wheel. (Measurement scale effectively 0.0 to 1.0). The raw SCRIM data is adjusted to account for SCRIM travel speed, temperature, etc. The data is then processed into MSSC, then ESC (see MSSC and ESC).

Skid Resistance: The coefficient of friction between a wetted road surface and a vehicle tyre.

Texture (Microtexture, Macrottexture and Megattexture): Microtexture is the sub 0.5 mm texture on the surface of individual sealing chips. Macrottexture is the water drainage paths between individual chips. Megattexture refers more to pavement longitudinal profile, or roughness and relates to the tyre/road interface on the large scale.

Treatment: In the context of a response to low skid resistance, a general term to describe an action to make the road safer.

Threshold Level (TL): The threshold level is currently set at 0.1 below the IL and is the trigger level for determining priority for treatment.

3. INVESTIGATORY LEVELS

Investigatory Level (IL): A skid resistance warning level. If the skid resistance of a section of road is found to be below this level then an investigation is required to establish if a treatment should be undertaken. The IL's for different site categories are shown in Table 1.

Table 1: Investigatory Skid Resistance Levels

Site Category	Site Definition	Investigatory Level (IL)	Threshold Level (TL)
1	Approaches to: <ul style="list-style-type: none"> • railway level crossings • traffic lights • pedestrian crossings • roundabouts • Stop and Give Way controlled intersections (where the State Highway traffic is required to stop or give way), • One Lane Bridges (including bridge deck). 	0.55	0.45
2	<ul style="list-style-type: none"> • Curve < 250m radius • Down gradients > 10% 	0.50	0.40
3	<ul style="list-style-type: none"> • Approaches to road junctions (on the State Highway or side roads). • Down gradients 5 - 10% • Motorway junction area including On/Off Ramps 	0.45	0.35
4	<ul style="list-style-type: none"> • Undivided carriageways (event - free)* 	0.40	0.30
5	<ul style="list-style-type: none"> • Divided carriageways (event - free)* 	0.35	0.25

*Event-Free = Where no other geometrical constraint, or situations where vehicles may be required to brake suddenly, may influence the skid resistance requirements.

4. MODIFICATION OF THE INVESTIGATORY LEVEL

The IL may be increased or decreased where justified in terms of a total strategy for a substantial length of state highway. Examples include where:

- Multiple wet road crashes occur as a result of “loss of control” or “skidding” and the road surface at the site has an ESC value at or above the IL.
- Multiple factors (such as those included in Table 1 under “Site Definition”) occurring at the same location.

Further guidelines for modifying the IL levels at selected sites are outlined in the Notes to this specification.

5. ANALYSIS OF SKID RESISTANCE

To determine the priority for treating skid resistance sites, generate a RAMM report entitled “SCRIM Exceptions by Seal Length”. This report identifies sites where the average ESC is greater than or equal to the (TL) over the site category length. The TL is defined as sites that have a value of 0.1 below the IL.

6. TREATMENT SELECTION

6.1 Existing Surfaces

ESC values are defined as falling within three ranges, high, medium and low. For existing surfaces the following actions are to be undertaken depending on the ESC values relative to the required IL:

Table 2: ESC Values

ESC value	Definition	Action
High	Values of ESC above the IL	No action required in terms of this specification.
Medium	Values of ESC between IL and the threshold level (TL)	Inspect and prioritise for future maintenance within the annual programme.
Low	All values of ESC below the TL	These sites must be investigated, the cause determined, the appropriate treatment designed and programmed as soon as practicable as part of routine highway maintenance.

Reasons for medium or low ESC values include:

- Temporary reductions in SCRIM values (e.g. from contamination or binder tracking)
- Polished aggregate
- Flushed binder.
- Invalid data, e.g. aborted SCRIM readings.

Advice on site investigations and further verification which may be required is given in the notes to this specification.

6.2 Construction of Surfacing

The aggregate used for the construction of all surfacings, new or resurfacing of existing pavements, shall have a PSV as calculated below, or as specified in the contract documents, whichever is higher.

In the case of hot mix asphalt, at least 85% (or the percentage specified in the contract documents, whichever is higher) of the coarse aggregate fraction shall have a PSV as calculated below (or the PSV as specified in the contract documents, whichever is higher).

$$\text{PSV} = 100 * \text{SR} + 0.00663 * \text{CVD} + 2.6 \qquad \text{Equation (1)}$$

SR = Investigatory Level for the site

CVD = flow of commercial vehicles per lane per day (See Glossary).

PSV = Polished Stone Value of aggregate

Note: The CVD used above is the expected traffic flow at the end of the surfacing's life.