

**TECHNICAL
MEMORANDUM**

Noise and Vibration No.2

To All suppliers

Prepared by Stephen Chiles

Endorsed by Rob Hannaby

Date 29 November 2012

Subject Noise from anti-skid meshes on Bailey bridges

1. Introduction

The NZTA holds a stock of Bailey bridges, which are often used as temporary road bridges during construction projects. Anecdotally, Bailey bridges can generate impact noises if passing vehicles cause parts of the timber deck to move and hit each other and/or the supporting structure.

For an NZTA project in 2012 a temporary Bailey bridge was considered for a location near to residences. Due to concerns over impact noise, measurements were conducted at two NZTA Bailey bridges in service on local roads near Shannon, Horowhenua (2012).

These particular Bailey bridges tested did not generate significant impact noises for a light passenger vehicle being driven at 50 km/h. However, plastic/metal 'anti-skid' mesh installed on the timber deck running surfaces did generate tonal noise which could potentially cause disturbance if there were nearby residents. This is similar to tonal noise generated by regular transverse tining on road surfaces.

This technical memorandum provides an overview of the measurements of tonal noise generated by the anti-skid meshes on two Bailey bridges, and summarises other surfaces typically used on Bailey bridges.

2. Noise survey details

Parameter	Details
Personnel	James Block, URS
Time/date	0900h–1030h, 17 October 2012
Instrumentation	Svan 958 Analyser, serial number 20892
Bridge locations	Bridge A – Otauru Road crossing of Mangaore Stream, Shannon, Horowhenua (7 sections, 21.7 metres long, 5.02 metres wide, 3.6 metre wide lane) Bridge B – Hennessey Road crossing of Mangaore Stream, Shannon, Horowhenua (9 sections, 27.9 metres long, 5.57 metres wide, 4.12 metre wide lane)
Measurement position	Bridge A – 9.5 m from edge of bridge, microphone approximately at the height of the top of the bridge Bridge B – 4.4 m from nearest edge of bridge, 6.0 m from one end, microphone approximately 1.5 m below bridge deck
Vehicle	Toyota Corolla (GDC312), pass-bys at 50 km/h
Procedure	Prior to and after the noise measurements a field check was performed, including a calibration. The difference in calibration levels was 0.0 dB. Continuous audio recordings were made during three pass-bys at each bridge.

3. Bridge and mesh photographs



Bridge A – Otauru Road



Bridge A - Plastic mesh on running surface



Bridge B - Hennessey Road

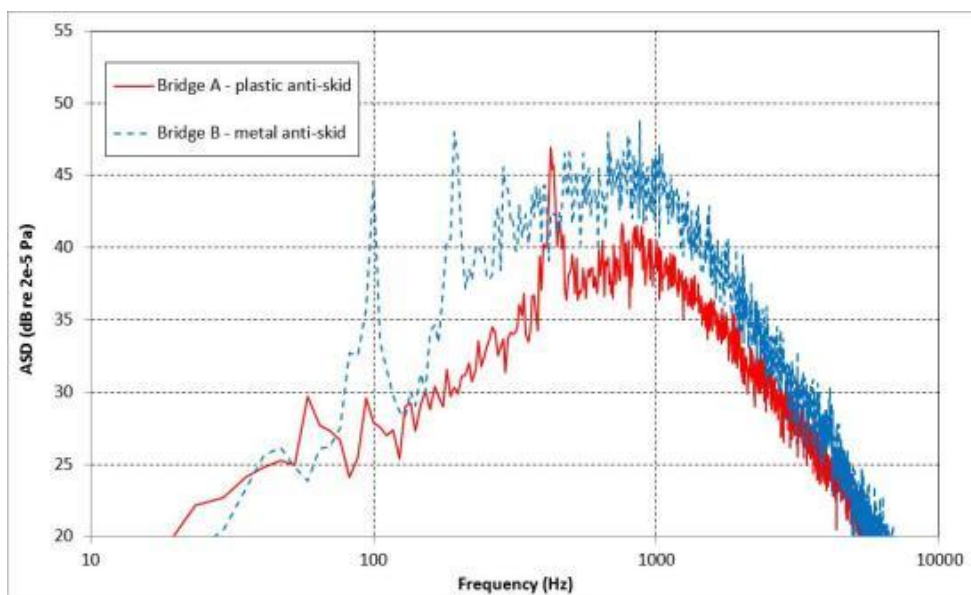


Bridge B - Metal mesh on running surface

3. Results

The average L_{Aeq} for the duration of each vehicle pass-by was 72 dB L_{Aeq} for Bridge A (at 9.5 metres from the bridge) and 73 dB L_{Aeq} for Bridge B (at 4.4 metres from the bridge, below the bridge deck height).

The tonal noise is illustrated in the spectra below, with fundamental peaks at approximately 420 Hz for Bridge A (plastic mesh) and 193 Hz for Bridge B (metal mesh). The frequency is related to the spacing of transverse elements of the mesh. The metal mesh has a wider spacing of transverse elements and therefore a lower frequency tone.



Examples of the audio recordings for each of the bridges are available on the NZTA Transport Noise website (www.acoustics.nzta.govt.nz) with this technical memorandum. These audio files include sound of water in the stream under the bridges as well as the vehicle/surface noise from the bridge.

While these tests did not show significant impact noise from the Bailey bridges, that issue should be reviewed for any future bridges installed near residents.

In summary, meshes with regular transverse elements have the potential to generate tonal noise which may cause annoyance for nearby noise sensitive receivers. This issue should be reviewed for any future bridges installed near residents. From research into tining of road surfaces it is expected that meshes with irregular elements or primarily longitudinal elements, would not generate such pronounced tones.

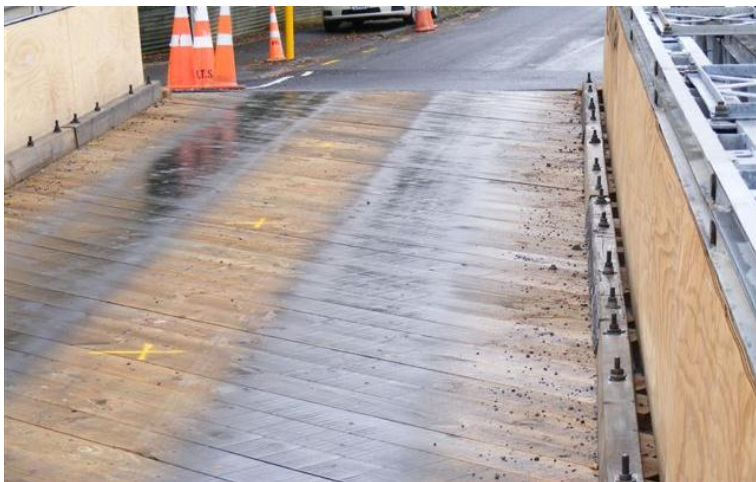
4. Alternative bridge surfaces

Running surfaces on NZTA Bailey bridges are not required to have plastic/metal meshes. The choice and installation of running surfaces is the responsibility of the bridge hirer, although are agreed with the NZTA. The photographs below show two surfaces recently used, without plastic/metal meshes:

- Bituminous anti-skid surface
- Timber running deck with no anti-skid surface



Bituminous running surface



Timber running surface