Wilson Acoustics Limited

Noise and Vibration Consultancy

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West Island Line (WIL) EIA Groundborne Noise Assessment
Inclined Turnout Vibration Measurement Report

Date: 14 April 2008, 1500 to 1800 hours
Location: Approximately 50.7km West Bound of Lantau Railway (Adjacent to Siu Ho Wan Depot)
Personnel: Measurements conducted by Wilson Ho, CY Chan, Banting Wong and Thomas Fok of Wilson Acoustics Limited, assisted by David England, Tim Chan and Marco Lee of MTR
Instrument: 4-Channels Sound and Vibration Analyzer (Svantek SVAN958)
4 Accelerometers (CSI A0720GP)

Introduction

Inclined turnouts are proposed to be used at West Island Line, however, its effect on railway groundborne noise was not defined in the previous studies. Previous airborne noise measurements at West Rail indicate that inclined turnout is significantly quiet than conventional vertical turnout. The measured airborne noise level increase is around 2 to 3 dB(A) for inclined turnout comparing to 5 to 10dB(A) increase for conventional vertical turnout. This report presents the measurement results of ground vibration level increase due to inclined turnout for use in groundborne noise prediction of WIL EIA.

Measurement Method

Ground vibration levels were measured at 12.5m and 25m from track centerline at turnout and plain line locations. The tested turnout is located at approximately 50.7km West Bound of Lantau Railway (Adjacent to Siu Ho Wan Depot), where both TCL and AEL trains share the same track. Measurements were conducted at operational track.

At 12.5m from track centerline, vibration sensors were mounted on top of a nail punched 150mm into soil. At 25m from track centerline, vibration sensors were mounted on concrete road surface by bee wax. Photos of the vibration sensor mounting locations are shown in the attachment.

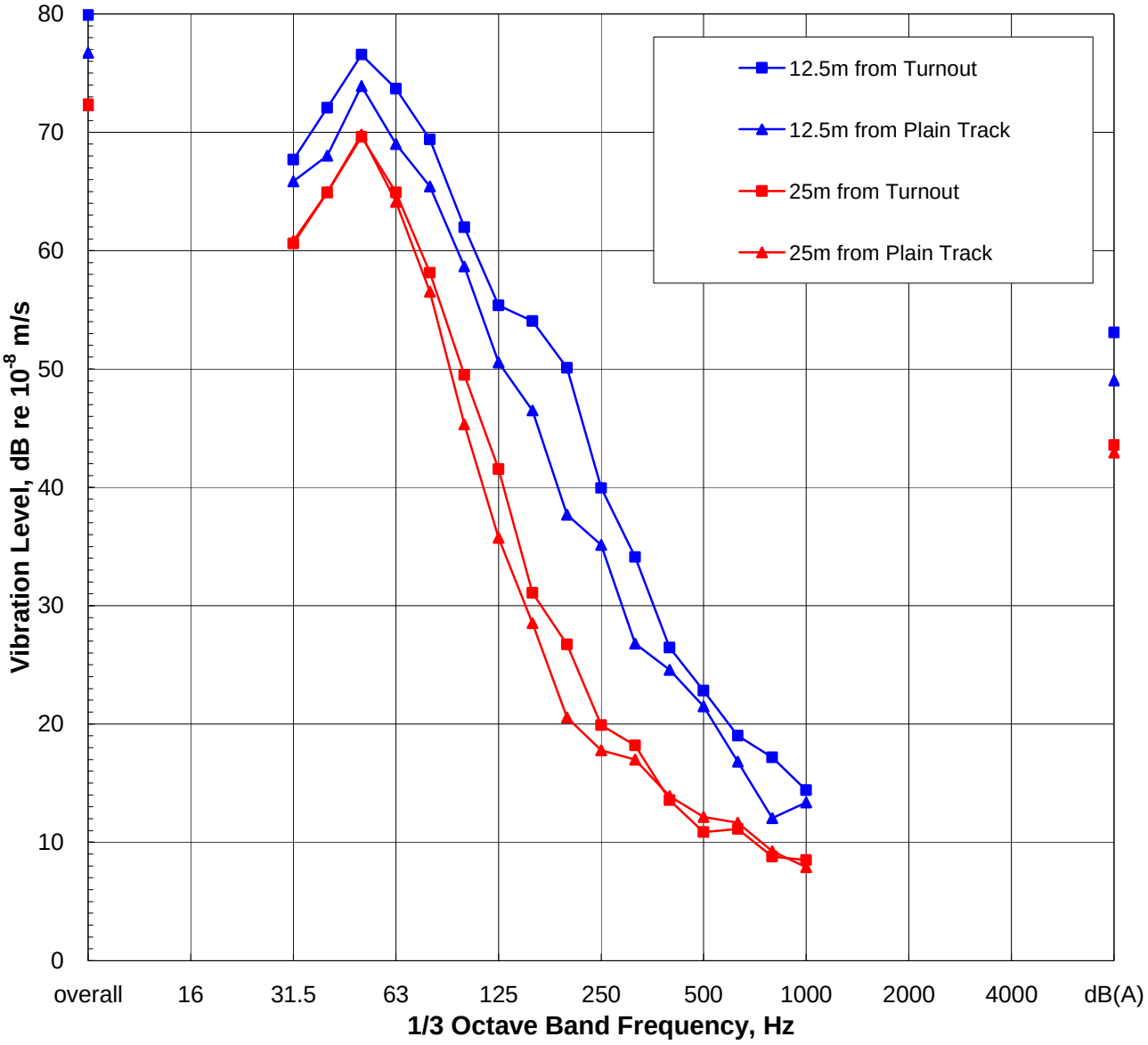
Measurement Results

1/3 octave band vibration spectrum ($L_{eq,0.5s}$) were recorded consecutively for every 0.5 second during the passby period. The recording was started and stopped at minimum 2 seconds before and after the train passby respectively. Both AEL and TCL trains were running at approximately 130kph when passing by the measurement locations, where the passby duration was approximately 5 seconds.

Passby vibration spectrum was obtained by taking RMS average of 10 set consecutive 0.5 second spectrum for each train passby. The passby ground vibration spectrum induced by AEL and TCL trains are very similar.

Chart 1 below present vibration spectrum averaged over 8 typical pass-by events, including 4 AEL and 4 TCL trains.

Chart 1: Average Pass-by Vibration Spectrum



The turnout ground vibration level is 4.1dB(A) and 0.6dB(A) higher than that at plain line at 12.5m and 25m from track centerline respectively.

For conservation approach, **5dB** turnout correction factor is recommended for groundborne noise prediction in WIL EIA.

Prepared by:	Cheuk-Yin Chan	Signed:	Date: 21-Apr 2008
Checked and Approved by:	Wilson Ho	Signed:	Date: 21-Apr 2008

Photo

Photo 1: Vibration sensor mounted on top of a nail punched 150mm into soil at 12.5m from turnout

Photo 2: Vibration sensor mounted on top of a nail punched 150mm into soil at 12.5m from plain track

Photo 3: Vibration sensor mounted at concrete road surface by bee wax at 25m from turnout

Photo 4: Vibration sensor mounted at concrete road surface by bee wax at 25m from plain track