design advice

MARSHALL DAY Acoustics

PROJECT:	114 Riccarton Road West, Mosgiel	DESIGN ADVICE No.:	Da 001
TO:	MWH New Zealand Ltd	FAX NO.:	By email
ATTENTION:	Denise Anderson	DATE:	6 April 2009
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VIBRATING ROLLER – PROTECTION OF SENSITIVE BUILDINGS

The purpose of this design advice is to give guidance for the safe, closest approach, of a vibrating roller of category "B2" to brick stables of historical significance located at 114 Riccarton Road.

Our guideline limit includes a small allowance (margin of safety) to allow for variability in the specific equipment used and operator practice/error.

SUMMARY

- The following applies to vibrating rollers meeting the category definition of "B2".
- When NOT vibrating, rollers may operate normally at any point along the roadway adjacent to the stables or other structures.
- When vibration functions are ON, the point of closest approach to the stables' foundation is to be no nearer than 20 metres.
- When vibration functions are ON, the point of closest approach to any dwelling foundation (or building of similar design and purpose) is to be no nearer than 10 metres.
- Where, owing to the style of structure, condition etc of the dwellings it is considered that they are sensitive to vibration, the point of closest approach with the vibration function ON should be 20 metres.

METHOD

Measurements of vibration were made in accordance with DIN 4150-3:1999-02 *Structural Vibrations in Buildings, Effects on Structures.* Triaxial measurements of particle velocity in mm/s were made using a series III Minimate with one geophone placed in the ground close to the stables' foundation, and the second geophone providing simultaneous measurement of vibration in the centre of the upper floor of the stables.

The roller used in these tests was a Dynapac CA151 fitted with a Deutz F4L 912 engine. The gross vehicle weight is 7,500 kg. Vibration mode was high-frequency (40 Hz) with low-amplitude.

DISCUSSION

Comparison of measured values was made against guideline values for different structures provided by section 6.1 of the Standard within Table 3 *Guideline values for vibration velocity to be used when evaluating the effects of long-term vibration of structures.* This requires the use of the peak particle sum of the two horizontal modes of vibration. DIN 4150 notes "Experience has shown that if these values are complied with, damage will not occur".

The guideline values from Table 3 of DIN 4150 are reproduced below, together with our recommended closest approach while the vibration function is ON. Compliance with these closest approach limits will ensure that the guideline limits are not exceeded.

We have assumed that the stables are classified as "sensitive" and that the applicable guidelines are contained in Line 3 of the table below. We have no expert knowledge as to the structural integrity of the stables or any other building in the area.

Line	Type of structure	Guideline values for velocity, v_i, (mm/s), of vibration in horizontal plane of highest floor, at all frequencies	Recommended point of closest approach to any part of building foundation (metres).
1	Buildings used for commercial purposes, industrial buildings, and building of similar design.	10	5
2	Dwellings and buildings of similar design and/or occupancy.	5	10
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order).	2.5	20

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SIGNED: Rob Hay DATE 6th April 2009