Boundaryline

Acoustic Report

SMARTWALL

13 May 2019

Boundaryline Fencing Systems

Attn: Hugh McGaveston

Dear Hugh

SMARTWALL FENCING - ACOUSTIC RATING

1. INTRODUCTION

Earcon has been engaged to undertake a review of the acoustic performance of the Boundaryline Smartwall 1800 and 2000 Acoustic Fencing. The review is based on design drawings by Boundaryline dated 23/04/2019.

2. DESIGN CRITERIA

The New Zealand Standards and NZTA proposes several design requirements pertaining to acoustic mitigation, including acoustic fencing. The NZTA recommendations generally refer back to the NZS 6802, as well as other factors and recommendations useful in assessing noise effects associated with road traffic and the effect of fencing. This assessment also takes into account the NZ standard 6806 in regards to road noise mitigation.

NZS6806:2010 Acoustics – Road-traffic noise – New and altered roads

Section 8.2.2 Where the need for noise mitigation measures has been identified, structural mitigation should only be implemented if the combination of the structural mitigation measures used would achieve the following:

- *(a) An average reduction of at least 3dB $L_{Aeq(24h)}$ at the relevant assessment positions of all PPF's (Protected premises and facilities) that are part of a cluster;*
- *(b) A minimum reduction of 5dB $L_{Aeq(24h)}$ at any assessment position(s) for each PPF that is not part of a cluster.*

And;

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Appending B Table B1 specifies:

The effectiveness of a barrier will depend on its density, height, length, and location. Noise barriers are more cost-effective when they are used for reducing noise received at a group of receivers (cluster) rather than when they are used for reducing the noise received at a single receiver.

To ensure adequate 'transmission loss', noise barriers should generally be constructed of materials that have a surface density of at least 10kg/m2 and build with no gaps to allow sound transmission. Suitable materials include concrete, fibre-cement board, steel, and wood.

3. CONSTRUCTION DETAILS

3.1 Construction Material – Cross Laminated Timber

The proposed construction material is cross laminated timber panels measuring 275mm high x 28mm thick and 1830mm long with tongue and grove detail allowing an acoustically effective seal between the panels. The cross laminated timber material is a radiata pine, with a density of 15.1 kg/m2. The steel posts shall have a density equal to the timber material of the panels.

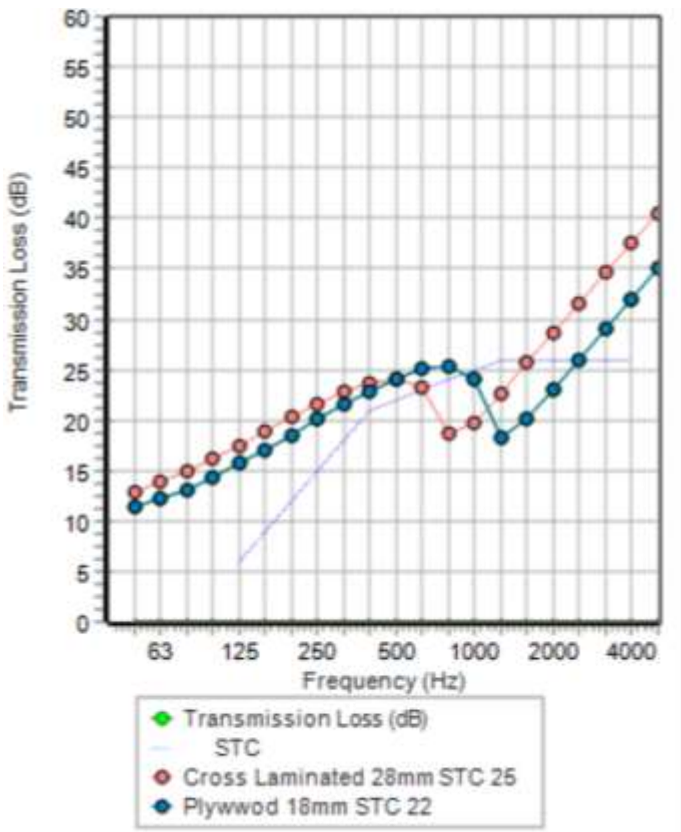
Relative to a similar typical acoustic fencing material, e.g. 18mm plywood panels, the proposed construction material provides a transmission loss generally higher with the exception of the 630 Hz, 800 Hz and 1000 Hz third octave bands where the cross laminated timber fencing performs 2dB, 6dB and 4dB less at these frequencies respectively.

Nevertheless, the overall transmission loss is 19dB or more at these frequencies and 14dB or more across the relevant spectrum. The resulting noise levels from use of this material will be dominated by the diffracted noise around the acoustic fencing.

Table 1: Transmission Loss of Cross Laminated 28mm Panel

	63	125	250	500	1k	2k	4k
STC 25 OITC 22	14	17	21	24	20	28	37

Figure 1: Comparison of Transmission Loss of Cross Laminated 28mm Relative to 18mm Plywood Panel



3.2 Construction Detail – Fencing Assembly

The proposed fencing will consist of twin steel posts providing a channel for the cross laminated timber fencing panels between timber beads on the posts. The timber panels, when installed on the posts would be offset 15mm each side from the centre of the post as shown in the figures on the page below.

The tongue and groove fencing panels are proposed to sit on a steel channel with a 50-100mm gap to the ground, see figures 2 and 3 below. This construction detail will result in up to a 3dB degradation to the effectiveness of the acoustic mitigation.

The acoustic fencing height is indicated in the drawings as 1800 and 1950mm high for horizontal panel constructions. This may provide up to a 4dB (7dB without gap at based of the fence) reduction. We note that this estimate is based on a flat environment with source and receiver in relatively close proximity to the acoustic fencing. The fencing performance is dependent on several factors unique to each site, including but not limited to topography of the site, relative distance from source and receiver, length and height of fencing, etc.

The overall performance of the proposed construction, with no more than a 100mm gap at the base, will meet the 3dB LAeq(24h) reduction with horizontal panel construction.

Figure 2: SmartWall 1800

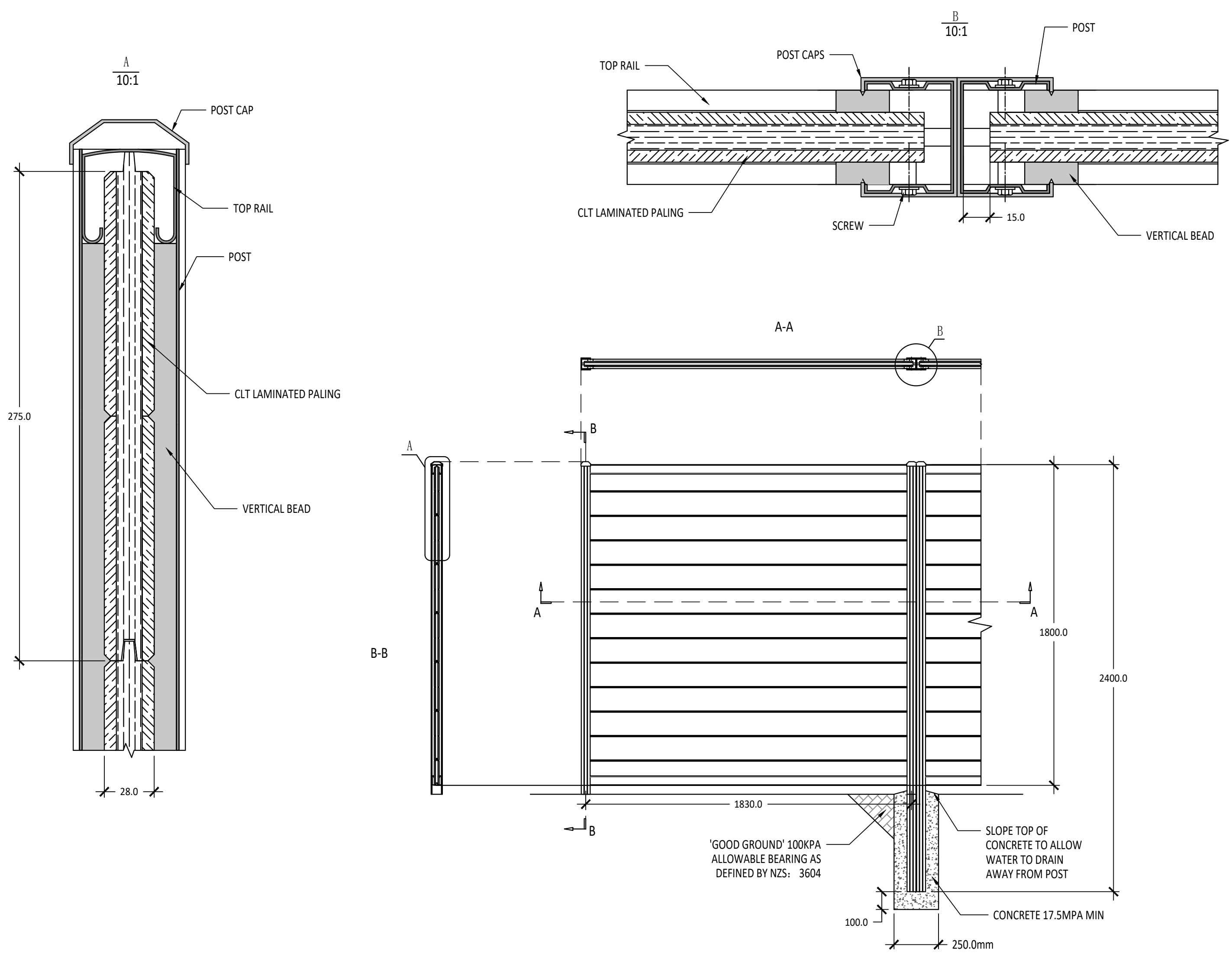
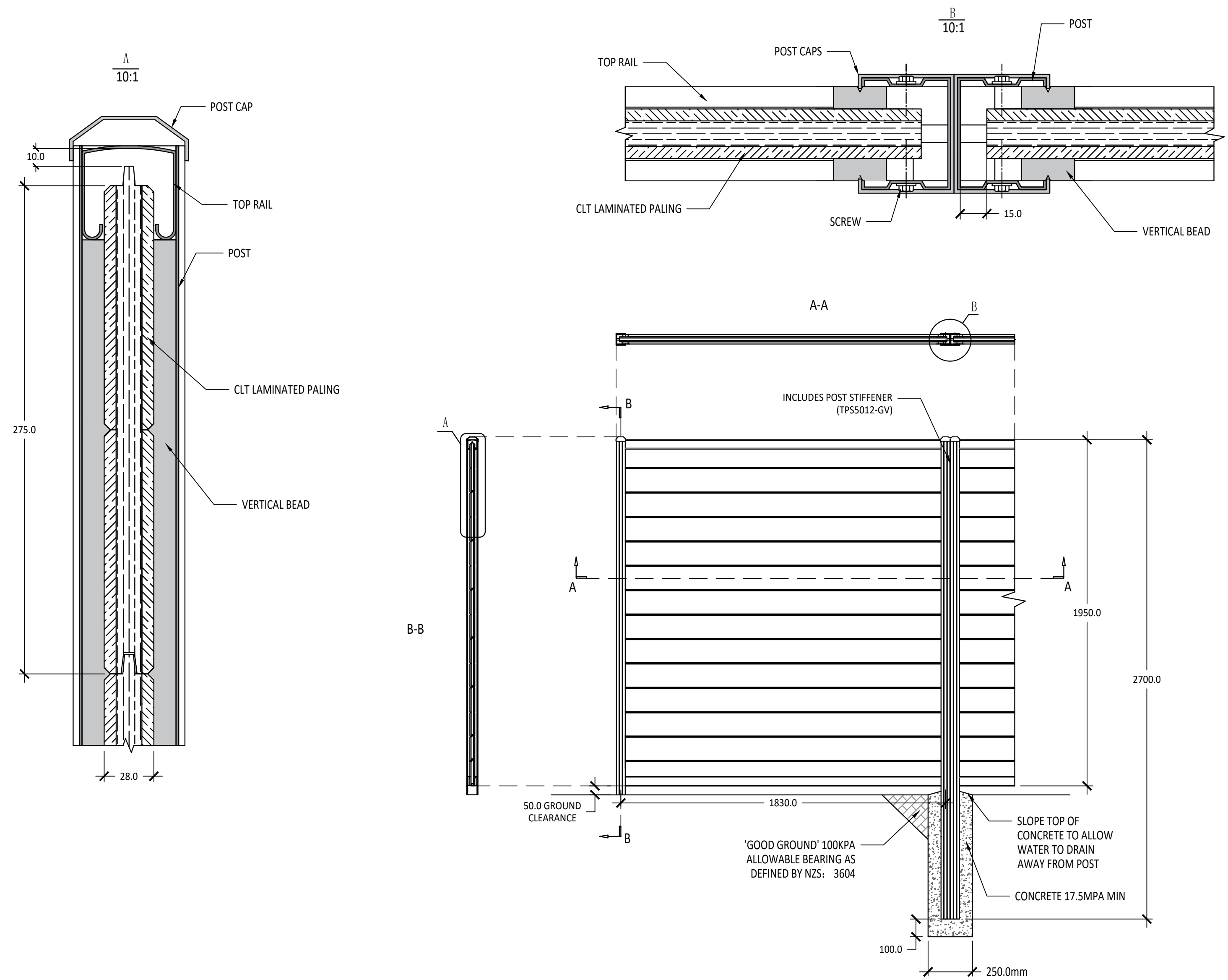


Figure 3: SmartWall 2000



4. CONCLUSION

The steel post and cross laminated timbre panel fencing construction materials, are suitable for producing acoustic fencing exceeding the recommended minimum density of 10 kg/m2.

The proposed fencing construction detail includes a base gap of 50-100mm. whilst not recommended from an acoustic perspective, the reduction in performance may remain within acceptable limits, relative to the recommended reduction of traffic noise specified in the NZS6806:2010. This may be required to be confirmed on a case by case basis. This degradation may be offset with increasing the fencing height, subject to engineering restrictions.

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