
Principles of Undertaking Acoustic Treatment Work & Examples of Solutions

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Purpose & Background

Port Otago have successfully completed a significant number of acoustic treatment works on properties neighbouring the port over the last 8 years. The process has included a lot of learning on the job and is worthy of summarising and sharing for the benefit of others.

This guide therefore gives an overview of the underlying principles of acoustic treatment. It also gives descriptions and examples of the type of work done to different elements of a dwelling to reduce the internal noise. It gives specific information on materials and products used in different situations as well as local contractors or suppliers.

A property specific assessment, undertaken by an acoustic engineer or noise professional will yield the best result for a property owner. This document will however provide a good understanding and guide for people wanting to learn more.

Successful Acoustic Treatment addresses the following FOUR critical FACTORS

1. Airtightness of Building
 - Noise (like cold) will follow the path of least resistance.
 - Any cracks or gaps will let in a lot of noise.
 - This must be the starting point.
2. Adding Mass to absorb energy of noise.
 - Heavy structures such as brick or stone absorb a lot of noise whereas timber is lower density and allows much more noise transfer.
 - Adding additional mass to different parts or elements of a structure will increase the amount of sound absorbed in that element.
3. Consider and assess ALL elements of the building.
 - Ensuring that all elements are dense, and working equally with others is very important.
 - For example there is no point in installing very thick laminated glass in a small window that has poor seals to the window frame and lightweight timber walls facing the port.
4. Location
 - The closer to the Port and the better view of the Port, the higher the outside noise level will be and the better the acoustic treatment required
 - The location of the noise sensitive rooms (e.g. bedrooms) will affect the treatment required; those rooms on the opposite side to the Port will generally require less treatment than those facing the Port.

Discussion about different building elements and typical work done.

Windows

- Ensuring a good seal around all windows is essential. A wide variety of products have been used successfully to achieve this depending on the windows. Modern aluminium joinery generally seals better than older timber joinery, although some modern timber joinery can also be very good.
- Laminated glass is the preferred option, not standard double glazing which can resonate with some noise.
- Typical thickness of laminated glass installed have been 10.38mm - 17.38mm for the high exposure (Red Zone) properties and 6.38 - 8.38mm for mid-exposure properties (Blue Zone). The larger the window the thicker the glass that will be required.
- Many windows, both aluminium and timber can be retrofitted with laminated glass.
- If existing windows can't take laminated glass then new window sashes or frame can be fitted.
- Glasstech and Dunedin Glass have done the majority of windows and glass work.

Walls (Internal / External)

- Insulating the wall cavity. If wall linings are being removed, then ensure as a minimum standard R1.8 or R2.2 batts are placed in the wall cavity before the lining is put back on.
- Products sold as "acoustic batts" are typically no different than a standard "pink batt" in terms of performance but are more expensive.
- Internal wall linings. A single layer of preferably 13mm GIB noiseline is the minimum to replace existing linings, or to fix over existing linings. A second layer of 13mm GIB noiseline will make an improvement.
- The GIB Noiseline product is more dense than the standard GIB of the same thickness.

Roof & Ceilings

- This pathway for noise is less obvious but very important.
- Adding insulation (batts) in the roof space is an option that has been used, and has the benefit of both acoustic and thermal insulation.
- Adding 13mm GIB noiseline to the underside of ceilings.
- Adding a layer of 20mm or 25mm plywood on top of the ceiling battens and under the roofing material (ie corrugated iron). This does require removing the roof (corrugated iron) and replacing it afterwards but does make a significant difference.
- **It is VERY IMPORTANT to confirm that the ceiling and roof structures are strong enough to support the additional weight of material added. In some cases structural improvements have been necessary to carry the extra load.**

Floor

- This pathway for noise is for example a house is built above the ground on timber piles.
- The noise can sneak in under the house and up through the floor.
- If carpet and/or flooring is being lifted or replaced, a 12-20mm thickness ply of can be added to increase the mass of the floor.
- Or adding a timber or ply skirt from the floor level down to ground level around the noisy perimeter of the house can achieve a reduction in noise through the floor.

Ventilation

- Having a dense, tightly sealed and airtight dwelling provides for a quiet internal living environment, but it is important to still have a supply of fresh air.
- Ventilation systems are a common feature of all properties that have been treated by Port Otago.
- The ventilation provides a quiet and constant supply of fresh air to the dwelling.
- Condensation Control, Harbour Electric and Davies Heat and Cool are all contractors we have worked with on acoustic treatment work.

Every Property is Different !!

There is not a single solution that can be applied to an individual property. Every property needs to be assessed in its own right taking into account the following :-

- Level of Noise Received – the higher the external noise, the greater amount of work required for the same property and same internal noise level.
- Sensitivity of person – some people are more sensitive to noise than others.
- Type of Construction – eg weatherboard, modern plaster, double brick.
- Age & current condition of dwelling.
- Where the noise is coming from.
- Confirming the existing structure can support the weight of added mass.

A detailed assessment for an individual property will provide the best overall solution. Builders, engineers or architects who have done similar work to this, or suppliers or contractors mentioned here would all be very useful to assist a property owner wanting more specific or detailed advice.

