

Noise wall costs

May 2018

The NZ Transport Agency has previously published indicative costs for the supply and installation of new noise walls*. This case study highlights the additional associated costs that need to be considered when planning new noise walls. These costs can relate to additional costs associated with installing noise walls as a standalone project, rather than installing noise walls as part of larger road improvement works, in addition to ongoing maintenance requirements.

* <http://nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Noise-and-vibration/Standards/Technical-memoranda/Tech-memo-NV7-Noise-mitigation-costs-v1.0.pdf>

SH1 ELLERSLIE, AUCKLAND

The NZ Transport Agency has completed high-level noise modelling and mapping of the Auckland Motorway network. This work identified areas of elevated road-traffic noise exposure in a number of locations in Auckland, which included residential areas adjacent to the Southern Motorway in Ellerslie. The Transport Agency installed three noise walls in Ellerslie in 2017 to reduce this noise exposure.

The Ellerslie noise walls were designed by GHD with Clynt White (Urban Designer and Landscape Architect) and Mana whenua appointed artist Johnson Witehira. A suite of wall types were developed to address situations such as when walls are next to the highway, set back behind planting, and/or visible from residential properties, public spaces and local streets.

Supply and installation costs for the noise walls were \$1590 to \$2600 per linear metre. The total cost of installing these noise walls was \$6500 per linear metre. The total cost reflects the additional costs associated with installing noise walls as a standalone project, including constraints and complexities encountered at the sites.

Works adjacent to a state highway must address matters such as safety, urban design, landscaping, stormwater and contaminated land. There are also general costs such as design, project management and traffic management.

Examples of additional costs that can be associated with installing noise walls as a stand-alone project, such as incurred at Ellerslie, include:

- Construction of new concrete safety barriers required where noise walls are close to highways.
- Extensive planting and detailed panel design to achieve good visual and community outcomes.
- Significant work to address contaminated land issues and stormwater systems affected by the noise wall installation.

By addressing these matters the works resulted in improvements beyond the noise reduction benefits of the walls. The costs of these associated works should be explicitly included in the budget when evaluating the viability of the project.

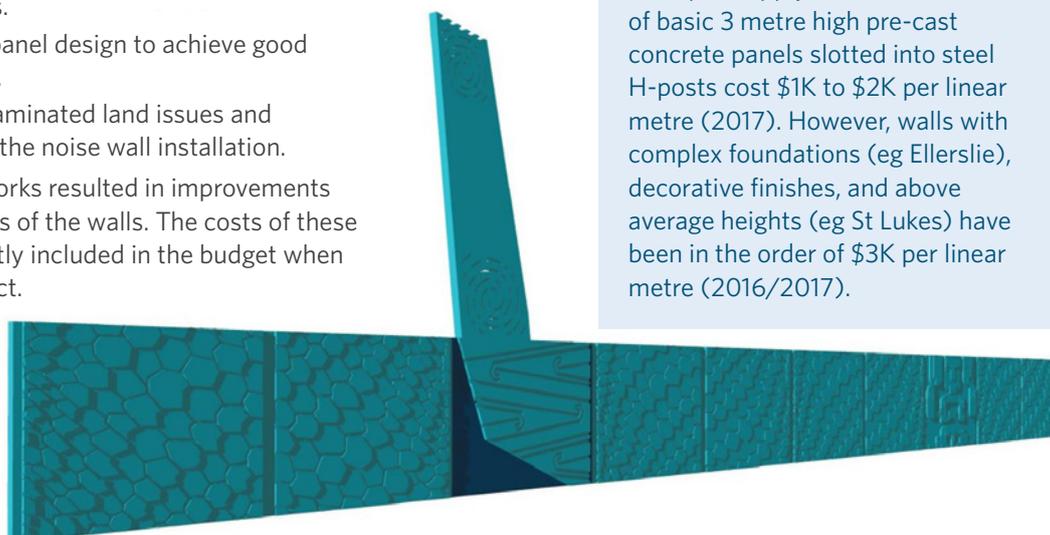


UNIT COSTS

In addition to providing indicative costs, the Transport Agency has previously reported actual costs for supply and installation of noise walls on various major projects. That summary table has been updated with costs of walls constructed in 2016/2017 at three locations in Auckland.

<https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/tools/noise-barrier-cost-calculator/>

The 2016/2017 noise wall installations have included some simple constructions which were similar to previous costs, and other more complex constructions requiring additional costs. For example, supply and installation of basic 3 metre high pre-cast concrete panels slotted into steel H-posts cost \$1K to \$2K per linear metre (2017). However, walls with complex foundations (eg Ellerslie), decorative finishes, and above average heights (eg St Lukes) have been in the order of \$3K per linear metre (2016/2017).



MAINTENANCE COSTS

The Transport Agency has installed numerous noise walls over the last two decades. Before this time 'noise barriers' were generally simple timber boundary fences. A significant number of these noise walls are by Auckland Motorways, and their routine maintenance costs (2018) have been reviewed with respect to differences between transparent (acrylic) and opaque (timber and concrete) walls. For the reasons discussed below, the examples of maintenance costs relate to protective coatings and graffiti removal, rather than repairs and renewals.

Some noise walls in Auckland have required repairs at an early stage to address construction/design issues, but these should relate to a capital cost rather than routine maintenance.

None of the Auckland noise walls have yet reached an age where they have required major maintenance or replacement, so no objective life-span information is available to compare different barrier types. Some timber walls in Auckland have deteriorated and it appears they will require major repair or replacement in coming years, corresponding to life-spans in the order of 30 years. There is no indication of any concrete walls likely to require major maintenance in the medium term, and life-spans in excess of 50 years are expected to be achieved. Transparent acrylic noise wall panels by SH1 in St Marys Bay warped within several years of installation, but remain in place and a reliable estimate of their expected life is hard to determine.

In terms of minor repairs, an example is the transparent noise wall by SH1 in St Marys Bay that required an acrylic panel to be replaced when it was damaged by a vehicle fire. In that instance the Transport Agency had a spare panel, from a limited stock held for various transparent walls in Auckland. However, when that stock is exhausted in future then further replacements are subject to a minimum quantity that could cost in the order of \$500K (2017).

Beyond such limited examples there is not sufficient data to compare routine repair costs of different barrier types.

The main comparative maintenance cost between different types of noise wall in Auckland is associated with protective coatings and graffiti removal. These costs are highly variable between different noise walls/locations and the incidence of graffiti can be affected by access and planting. The following is provided as an approximate guide to illustrate cost differences that could occur between transparent and opaque noise walls.

Illustrative costs for routine maintenance requirements have been estimated based on the following assumptions:

- Current practice in Auckland is to use sacrificial coatings on accessible parts of both timber and concrete walls, and protective films on transparent walls. Any paint finishes are covered with a sacrificial coating, and graffiti is managed through repainting.
- The assumed noise wall is 500 metres long and 3 metres high, with a coating/film on one side that is accessible.
- Costs are for a 25 year period in which sacrificial coatings would need to be replaced once due to aging and protective films would need to be replaced twice due to aging.
- The assumed wall is set back from the road such that works can be conducted with a shoulder rather than a lane closure (noise walls immediately adjacent to motorways generally don't need coatings/films as they are not accessible). For graffiti removal, the assumed shoulder closures represent around three quarters of the costs below.
- For the 500 metre long wall, replacement of a sacrificial coating is assumed to take four nights and replacement of a protective film five nights.
- The first cost provided below relates just to routine replacement of coatings and films with no graffiti removal. The second value is an additional cost for relatively frequent graffiti occurring, with two 4 metre square removals required each month.
- It has been assumed that 1 in 3 graffiti removals require replacement of a protective film, for example due to etching. Sacrificial coatings have been assumed to be replaced every time graffiti is removed, but in reality they can sometimes be cleaned without replacement.
- Costs are based on competitive rates currently being provided through the maintenance contract in Auckland.

Based on these assumptions, illustrative maintenance costs over 25 years at 2018 rates are:

	OPAQUE WALL	TRANSPARENT WALL
Maintain coating/film	\$35K	\$240K
Remove graffiti	\$400K	\$420K

LESSONS LEARNT

- The total costs of installing noise walls can far exceed the supply and installation costs of the noise walls themselves. While this can result in additional benefits, such as improved safety barriers, these additional costs should be accurately assessed when planning noise wall installations.
- For transparent noise walls, spare panels should be procured at the time of construction to facilitate future repairs. Potentially, future use of standardised panel types and sizes could reduce the number of spares required.
- Following review of existing noise walls in Auckland, it appears that concrete walls have a life-span in the order of twice as long as timber walls.
- There are differences between maintenance costs for opaque and transparent walls, but the highest costs can relate to traffic management which is similar for both types. Maintenance costs over 25 years can be a similar order to capital costs.



Graffiti removal in Auckland



If you require any additional information, please contact:

Greg Haldane
Principal Environment Specialist
NZ Transport Agency
environment@nzta.govt.nz