



GREENLANE LANDSCAPE REPORT

GREENLANE
Noise Barrier



Date: June 2008
Job No. 08134

INTRODUCTION

State Highway 1 is the main transport corridor passing through Auckland City from North to South. This project focuses specifically on the south bound section between Mount Hobson and Greenlane which lies just south of Auckland CMJ and Newmarket Viaduct and is part of the Transit New Zealand motorway network. 200,000 vehicles travel along the route everyday and with significant peaks during commuting times.

There are plans to add an auxiliary lane from Newmarket to Greenlane.

Transit's strong commitment to achieving quality environmental and community solutions includes the mitigation of traffic noise and vibration and improving the visual appearance of highways. As such, Boffa Miskell has been commissioned by Transit New Zealand to undertake a concept design for an acoustic barrier associated with the Newmarket to Greenlane works in order to ensure the aesthetics of the wall and visual amenity of stakeholders is an integral component of the design.

A noise wall is also required on the southbound section of the Newmarket Viaduct project parallel with Mt Hobson Road. The design of these two noise walls may be different. The Mt Hobson Road noise wall is separated from adjacent residential properties by Mt Hobson Road and the wall can be mostly screened by vegetation. The Greenlane noise wall has significantly greater physical constraints. It will be located against the edge of the live motorway and the back of the wall faces and is elevated above residential gardens.

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No i s e B a r r i e r : I n t r o d u c t i o n



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DESIGN INTENT

To develop conceptual design principles that can be utilised in the selection of the barrier. Issues to be addressed include the experience from the highway as well as the residential perspective on the other side of the barrier.




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Noise Barrier: Existing Walls within Auckland CMJ provide context



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Noise Barrier 

Half Bridge 

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 Noise Barrier: Key Layout Plan



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Dilworth School elevated from motorway

High quality native vegetation on cut batter

Noise attenuation not required due to topography

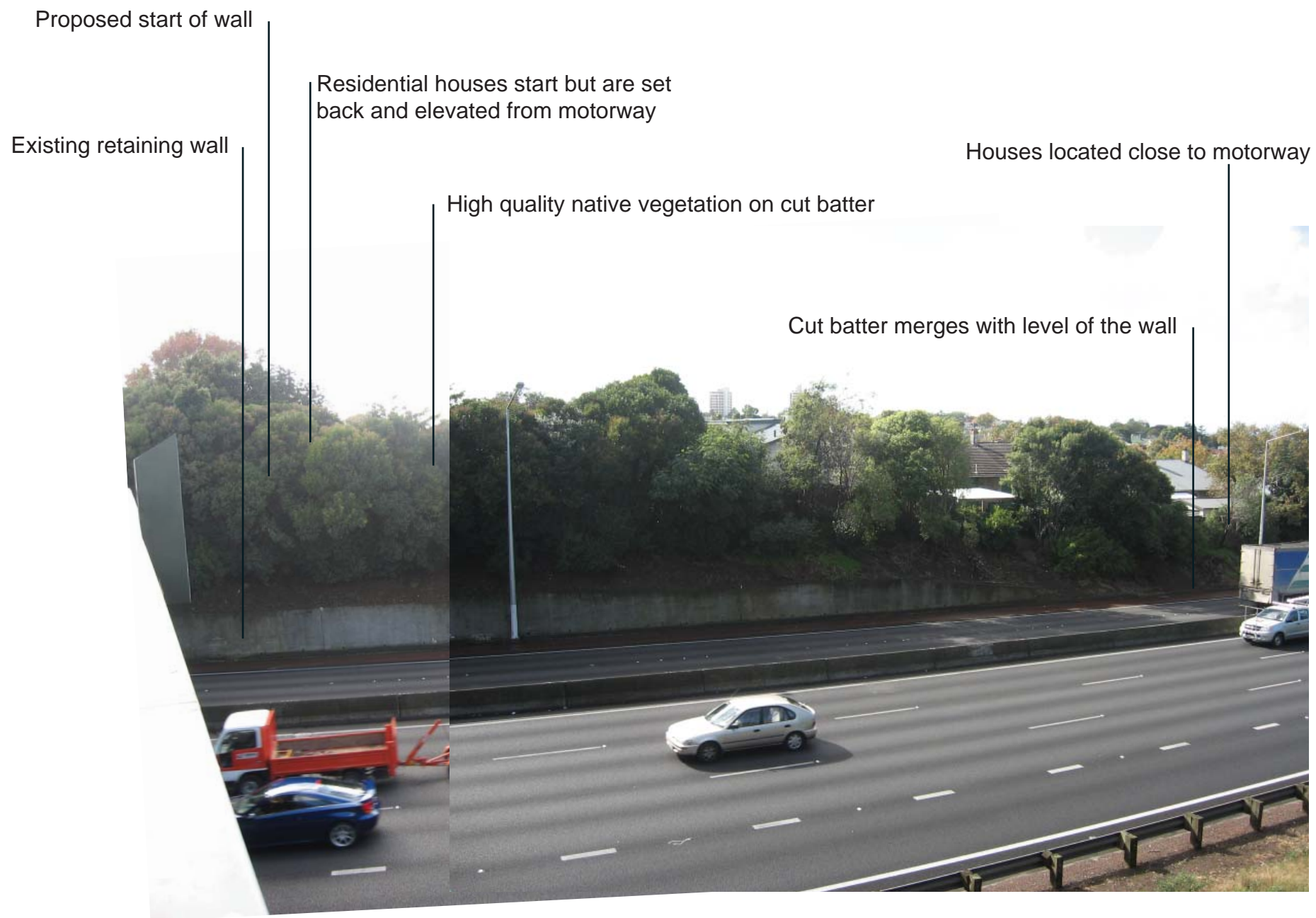


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Noise Barrier: Analysis south from Market Road Bridge



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Noise Barrier: Analysis from Omaha Road Bridge



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Vegetation screens visual effects of motoway



Carport built against existing retaining wall



Signage on motorway towers above resident's gardens



A variety of materials and finishes of boundary fence between two residential properties



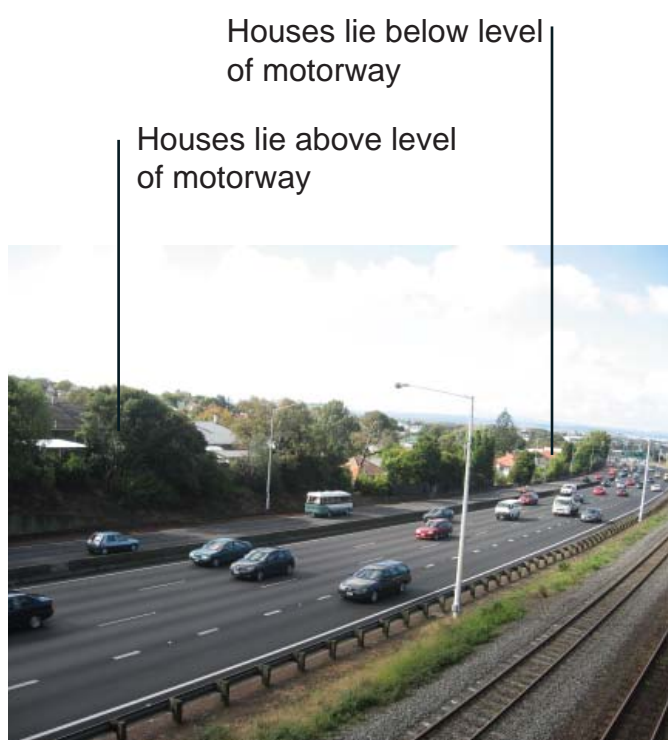
Hedging planted along boundary between residential property and motorway



Care has been taken by some residents to create an attractive back garden incorporating existing retaining wall, timber fence and planting

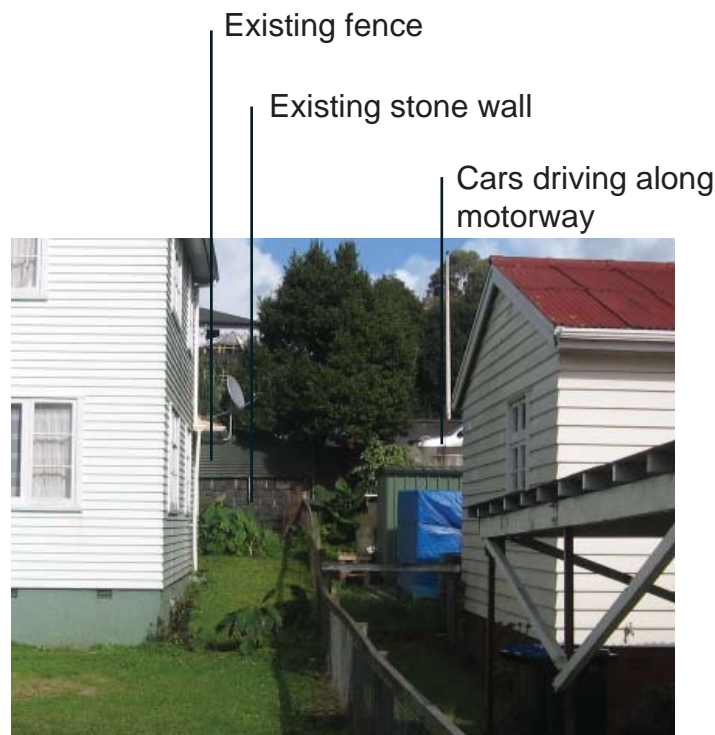


A truck passes very close to residential properties



Houses lie above level of motorway

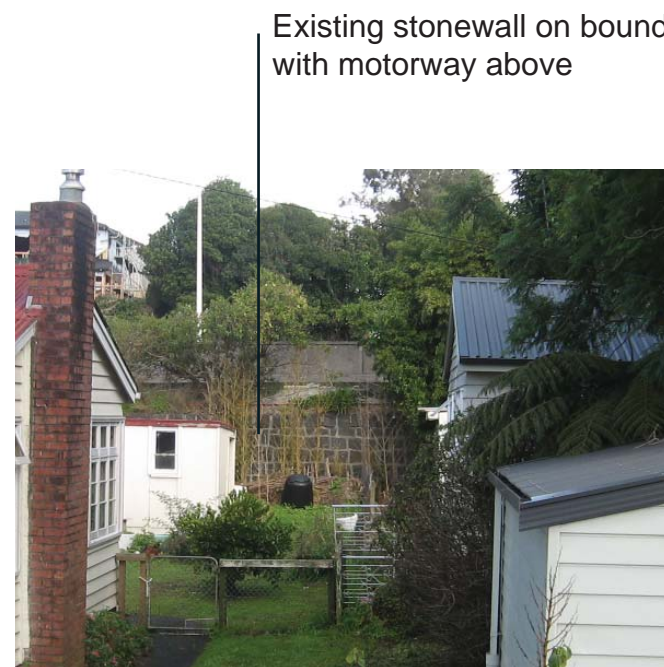
Houses lie below level of motorway



Existing fence

Existing stone wall

Cars driving along motorway



Existing stonewall on boundary with motorway above



A variety of treatments and heights of boundaries

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Noise Barrier: Analysis of existing half bridge



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Residential garages constructed on the boundary of garden and motorway



Houses at or slightly above level of motorway road level



Level of road surface at the end of Greenlane off-ramp lies above residential properties



Existing retaining wall and vegetation screens the visual effects of the motorway



Residential houses looking down to Greenlane off-ramp

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Noise Barrier: Analysis at Greenlane off-ramp



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CONCEPT

Specific design principles have to be applied when determining the height, location and material used for noise protection including:-

- Road design (height, width, depth of cuttings etc)
- Speed limit
- Ground topography
- Traffic volume
- Distance to nearby buildings

An assessment has been undertaken by Marshall Day to establish the barrier heights required to meet various noise performance criteria. An upper limit of 75dBA at all positions and an upper limit of 70dBA at all positions. The 75dBA performance criteria is the preferred solution as this results in the wall being up to 3m in height. Further improvements in acoustic performance would be better achieved by treating the upper levels of specific houses. To achieve 70 dBA the wall would extend up to 4m in height and therefore result in significant impacts i.e. shading and loss of amenity on the adjacent residents.



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Noise Barrier: Concept to meet 70 dBA performance criteria Fig 1



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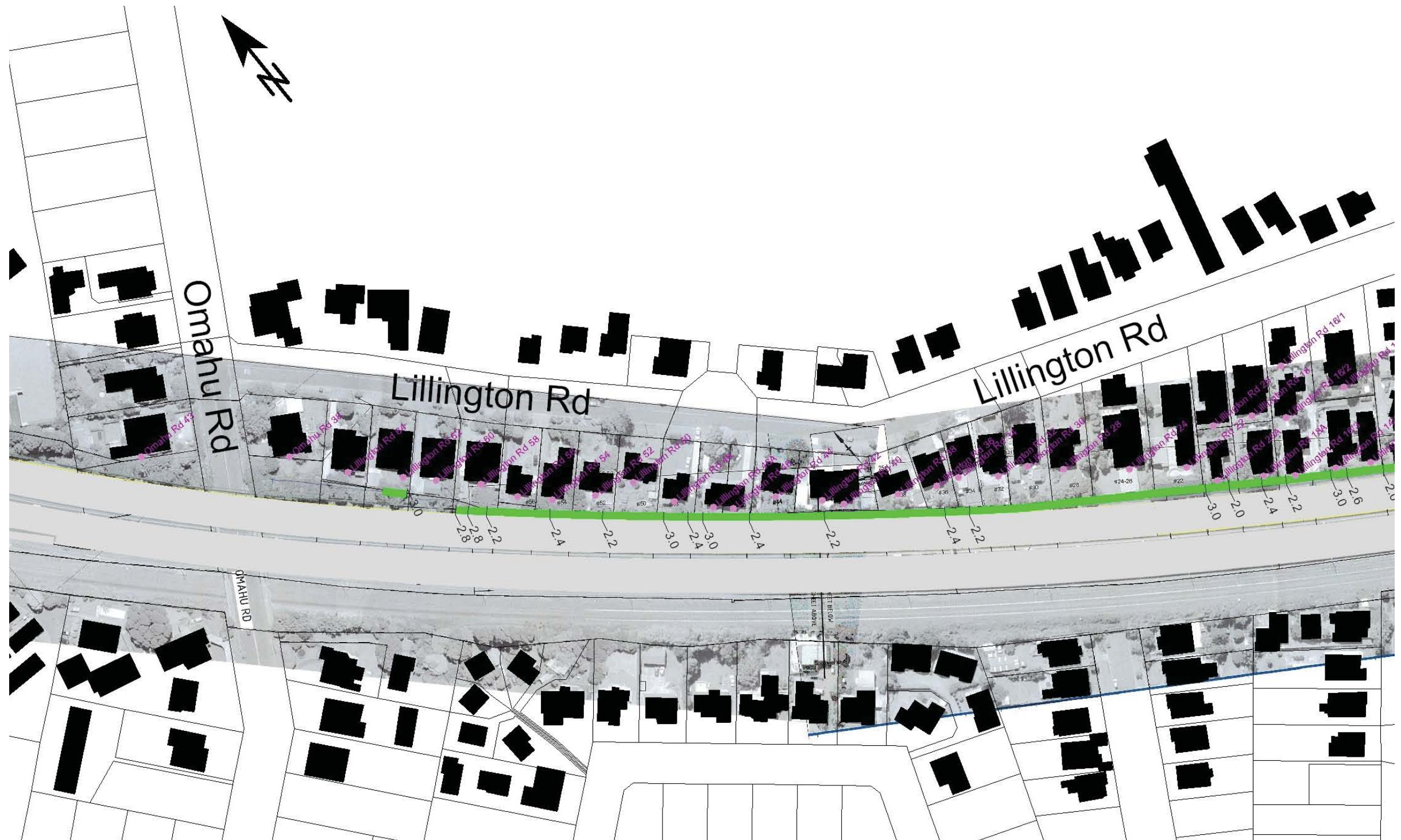


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Noise Barrier: Concept to meet 70 dBA performance criteria Fig 2



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Noise Barrier: Concept to meet 75 dBA performance criteria Fig 1

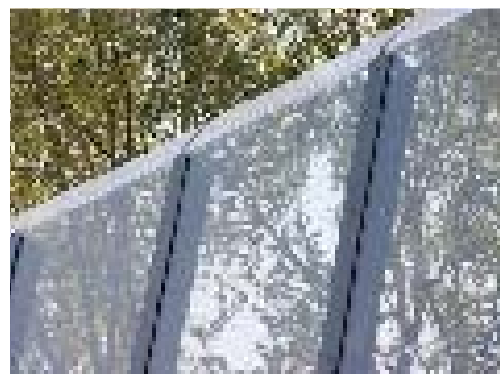


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TIMBER



TRANSPARENT



METAL



CONCRETE

In addition to aesthetic consideration, criteria for materials selection for noise walls should include:-

- Durability – consider the design life of the wall
- Weathering – consider the detailing of the wall
- Vandal proofing – ensure that materials are as vandal proof as possible
- Graffiti – how will the material react to graffiti and how easily can it be repaired
- Safety – are there any risks inherent in the material
- Fire retardance – is the material flammable
- Physical constraints and associated engineering / constructability issues

CONCRETE & PLANTING



Different colour concrete can add interest



Concrete shaped panels can make extra height variation interesting



Concrete Panels staggered can provide shadow effects



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Noise Barrier : Aesthetic Considerations



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CONCRETE THE PREFERRED CONSTRUCTION

Concrete is our preferred material for the noise wall.

Concrete has great inherent flexibility and is therefore very suitable for noise barriers. It is highly durable, weathers well and is not easily damaged. Texture and pattern can be created in precast concrete by a wide variety of means.

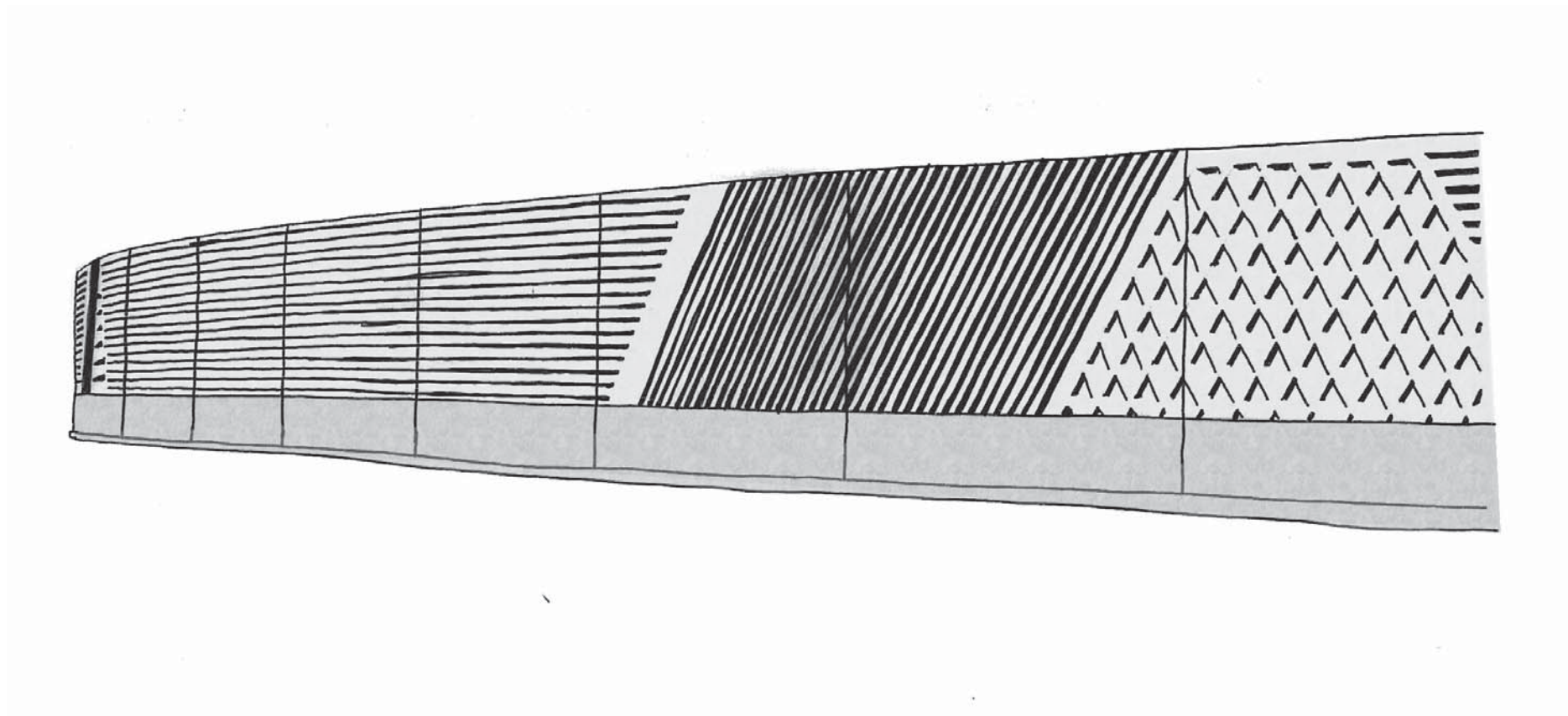
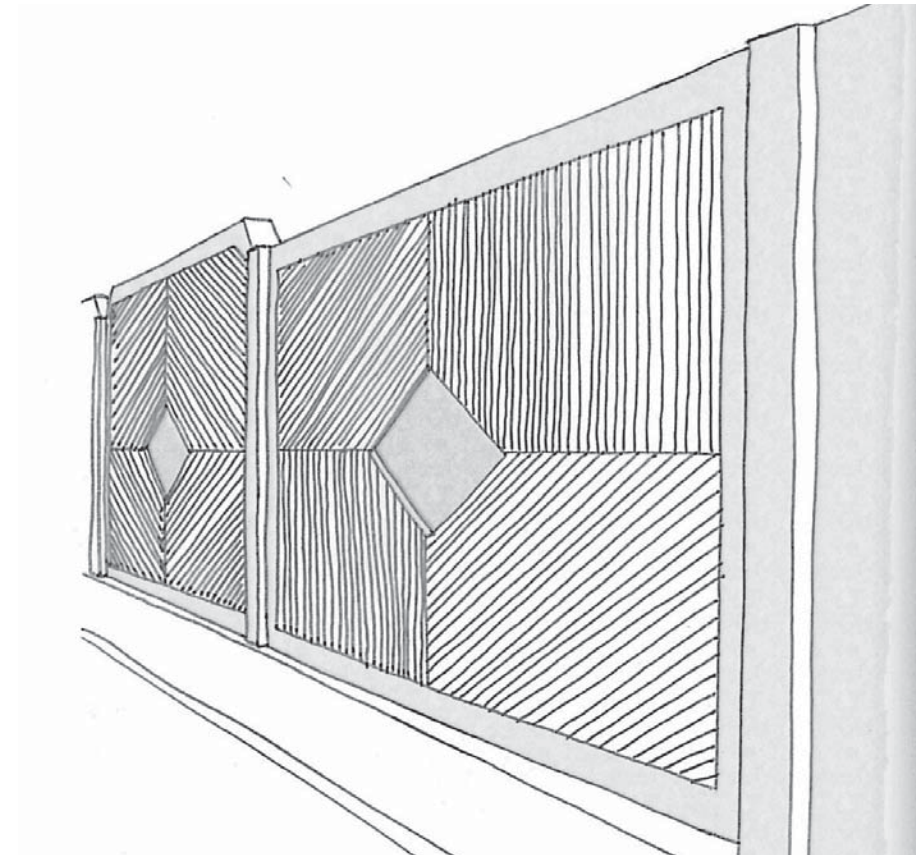
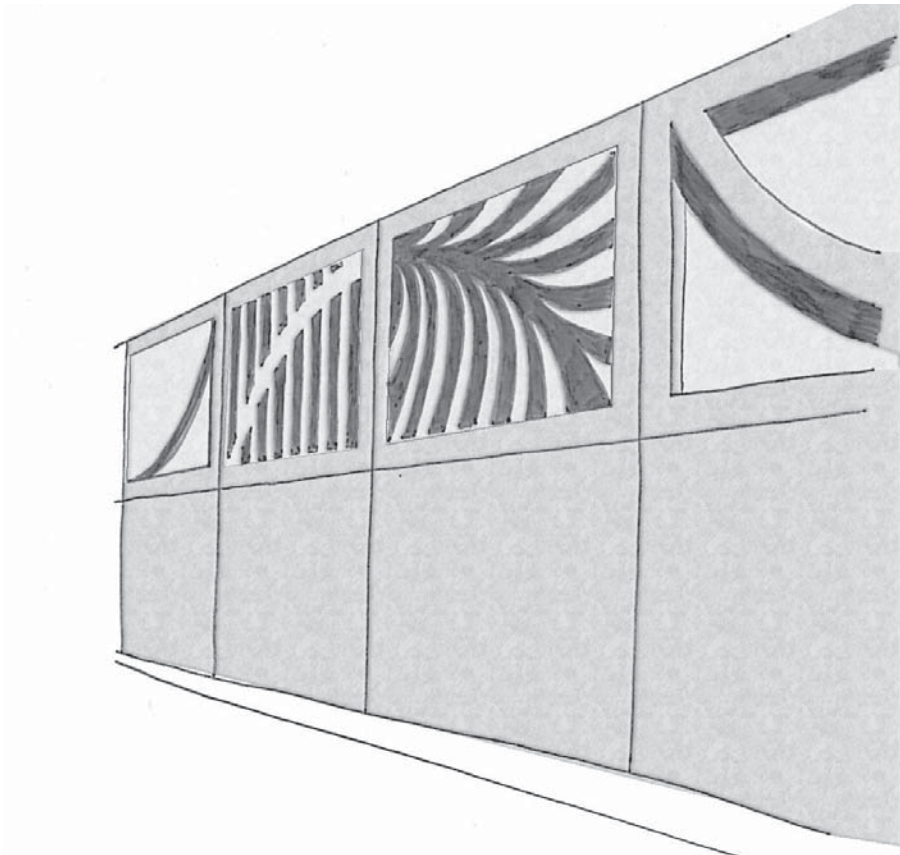
Heavily textured finishes and planting frames deter vandals. Graffiti resistant coatings can be applied as well as sacrificial coatings.

Concrete can also be painted and dyes applied in the mix create colour creativity.

Changes in height can be dealt with in various ways such as stepping or by constructing a curved top which can aid the flow of the wall.

Great care must be taken when designing the ends of the noise wall. They may be square turned or faded into the landscape, or alternatively may be deliberately emphasised as a feature.

A concrete wall has the added advantage that it could be integral with the crash barrier thereby requiring less space which is a key issue for the Greenlane project.

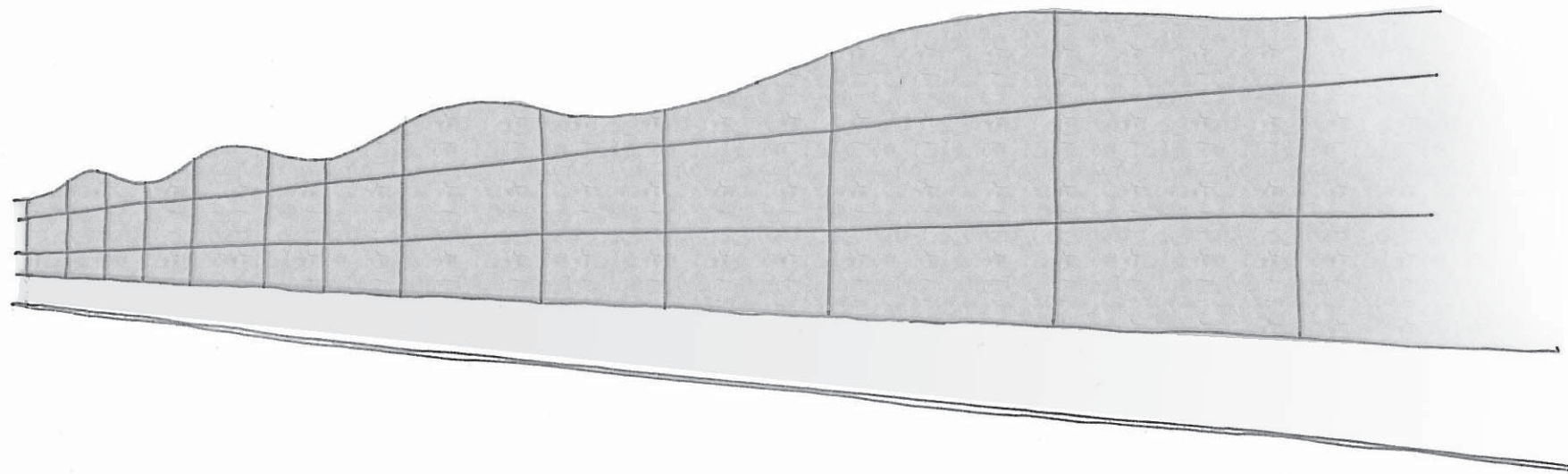


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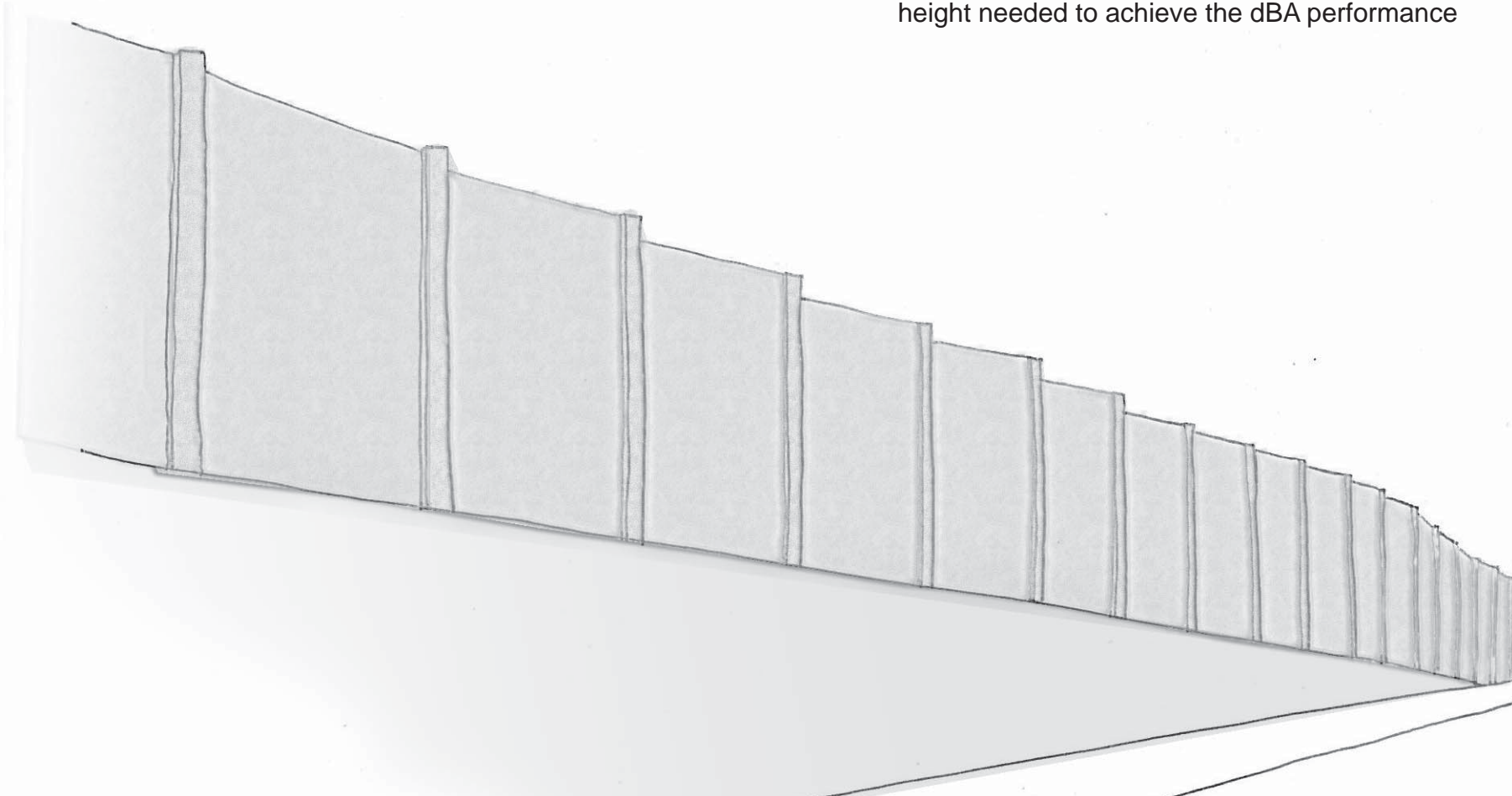
Noise Barrier: Concept Ideas

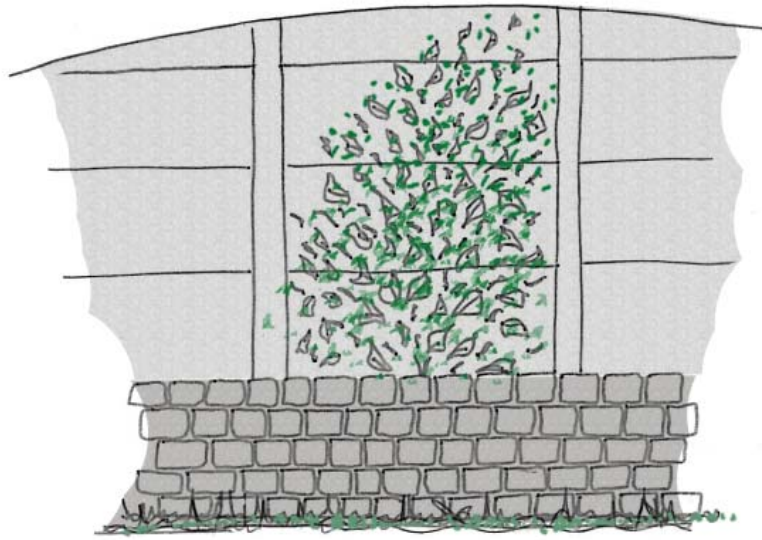


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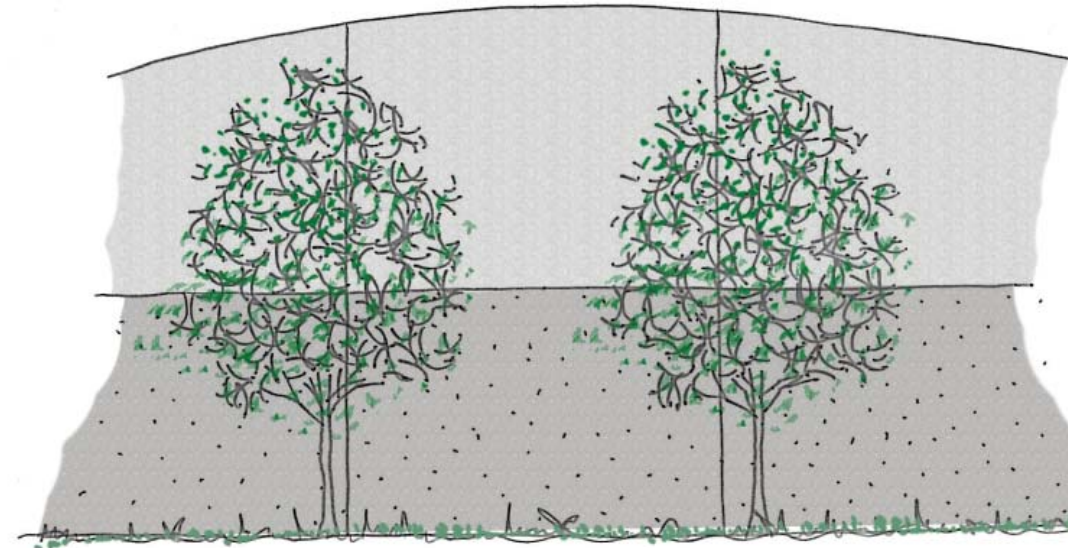


Curving the top of the wall deals with the variation in height needed to achieve the dBA performance

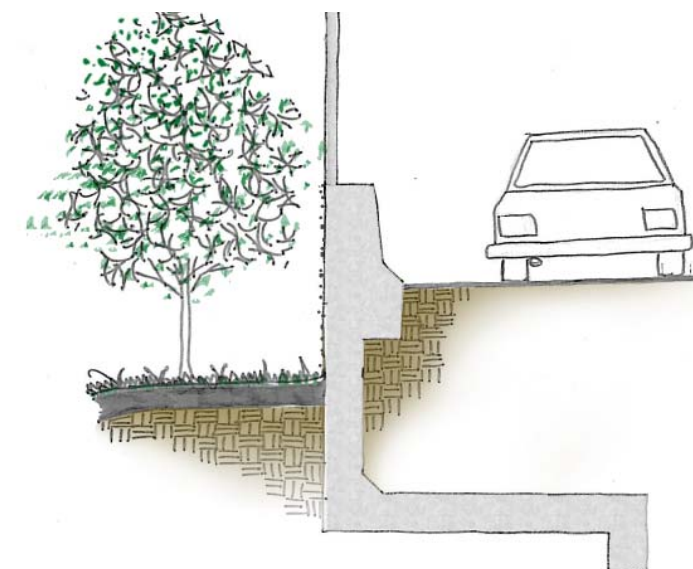
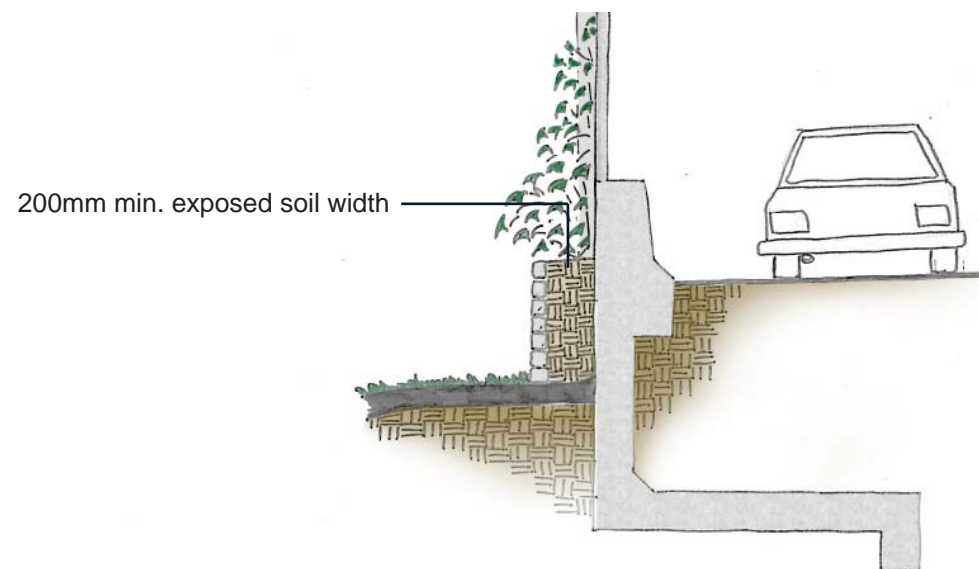




Curved concrete retaining wall. Natural stone planter built within residential garden with a minimum of 200mm of soil width. Climbers grown up plain concrete wall using either clinging climbers such as Boston Ivy or Ficus or by fixing wire between posts and planting plants such as Clematis or Tecomanthe speciosa



Curved concrete retaining wall. Plain concrete at the top and exposed aggregate concrete at the bottom. Small trees such as Yucca, Titoki or flowering cherry planted in residential gardens





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Noise Barrier: Concept Ideas



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Existing Conditions & Examples of Concrete Noise Walls





Existing Conditions & Examples of Concrete Noise Walls



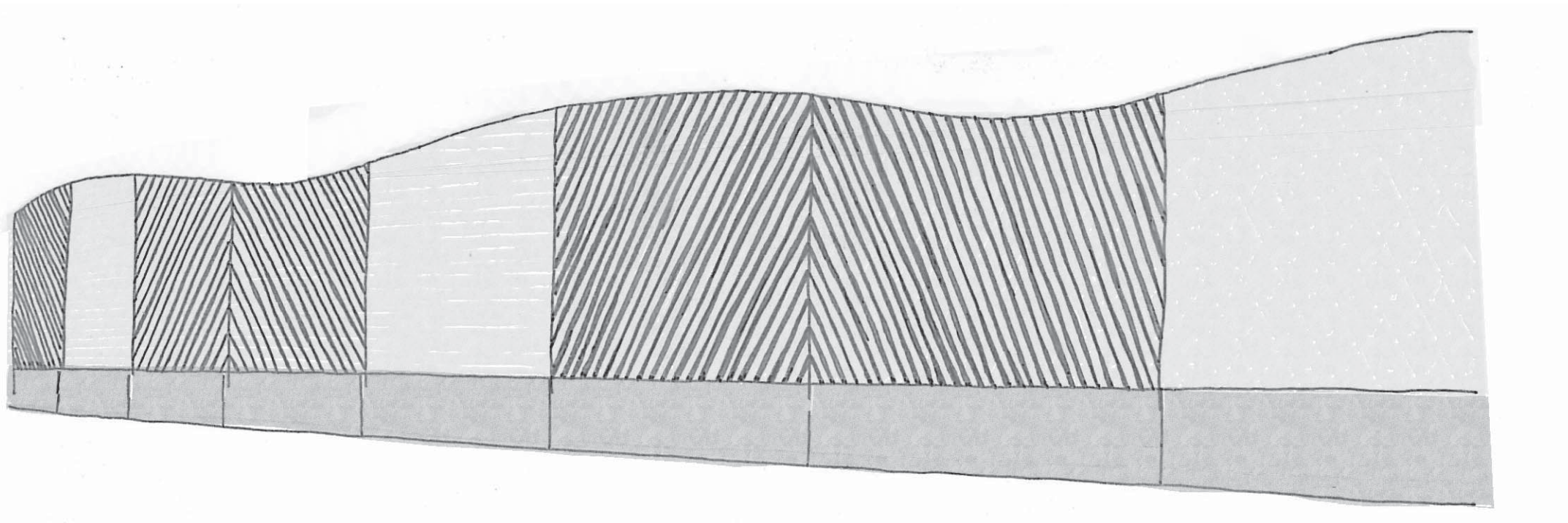
THE PREFERRED DESIGN SOLUTION

Concrete construction is the preferred material for this situation.

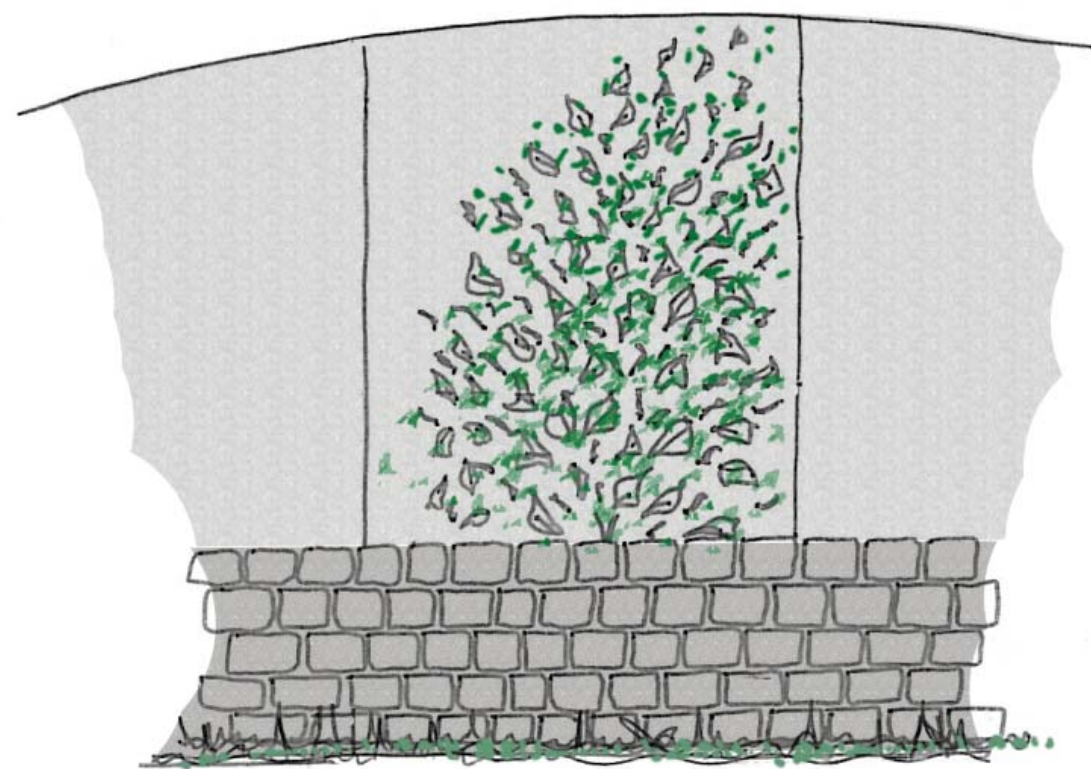
There is very little space for the noise wall hence it has to have a flat face rather than staggered which restricts the opportunity to introduce shadows or other physical forms of relief. Another constraint is the variable height requirements (2.0m - 3.0m) and associated shading effects of a 3m high wall. These constraints have influenced the concept and a flush face curved top form is preferred. The combination of butt jointed panels creates an almost seamless face, a geometric pattern contrasted with smooth concrete and a curved top wall will result in an overall effect that fits in with the form of the motorway and is in context with the variety of existing retaining walls that exist within CMJ.

On the residential side there is an opportunity to build another lower wall in front of the proposed concrete noise wall / retaining wall and thus creating a planter which can be planted with a variety of plants. In areas with space constraints these can merely be climbers. The concrete columns can protrude out from the wall creating shadows which break up the continuous face of the wall until such time as the vegetation covers most of the wall.

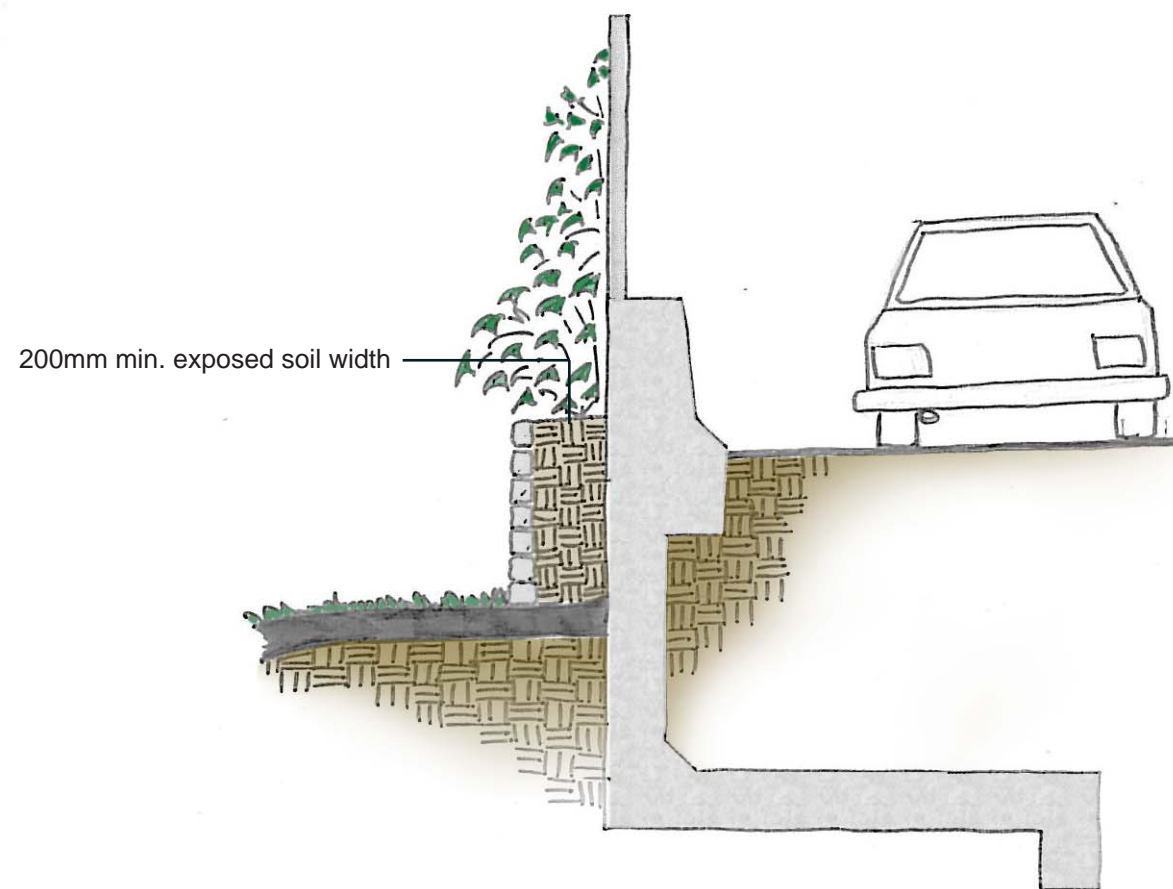
It is important that the ends of the wall tie into the landform or butt up to another structure. The ends of the wall should at least return in line with adjacent property boundaries.



Curved top with strong geometric texture/pattern



Concrete retaining wall and planter eventually to be completely covered by climbers



Section of concrete retaining wall and planter