STREET INNOVATIONS CHALLENGE

CYCLE SEPARATION

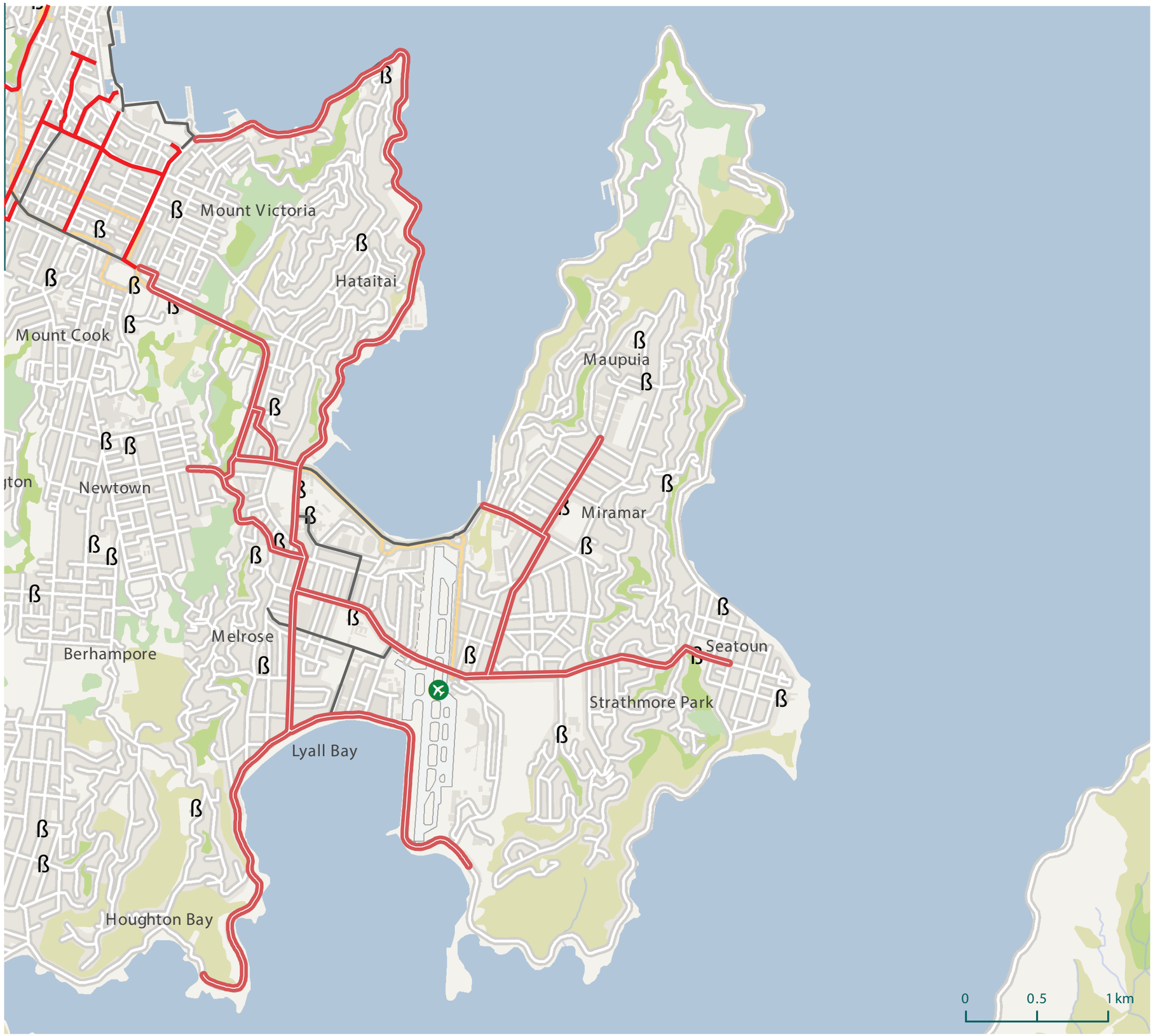
Archie Batchelor

PROBLEM/OPPORTUNITY

Throughout the urban fabic in all of New Zealand, there is an increased awareness and need for cycleways particularly in wellington. Streets are how we travel, connect, and experiance cities so creating safe and inviting cyleways that encourge citzens to shift from car to bike is essetential.

There are multiple benefits that come from this shift in modes of transport, such as reduced carbon emissions, promoting physical activity, decreasing traffic congestion, and improving overall urban livability.

There is a significant opportunity to promote this shift, as 60% of people are interested but concerned about cycling; of that group, 81% would feel comfortable using a separated bike lane. (Statistic for Seminar 1)



POTENTIAL CBD AND EASTERN NETWORK RECEIVING URBAN CYCLEWAYS FUNDING (ROUTES TO BE CONFIRMED)

EXISTING CYCLEWAYS

SCHOOLS

URBAN CYCLEWAYS FUNDED PROJECTS IN WELLINGTON EAST AND CBD

INSPIRATION

Topography

Coastline

Wind Movement

After reviewing previous solutions for bike lane separators, I realised there is often a lack of identity in their design, with minimal attention given to aesthetics. This results in the same generic designs being used across various cities and countries.

In addition to being functional, affordable, and adaptable, I wanted my design to reflect Wellington's unique identity. Through analysing its key characteristics, I concluded that the city is dynamic, with movement expressed not only through its natural elements but also in the vibrant and creative spirit, defined through its art and culture.

CONCEPT SKETCHES

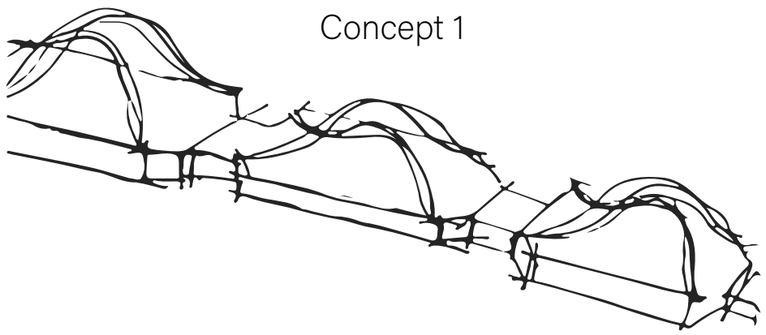
After analysing the city's identity, I started creating rough concept sketches to explore how the notions of dynamism and movement could be reflected in a cycleway separator design. I developed several concepts, ultimately selecting Concept 1 (shown below) and refining it through further development and adjustments.

The first concept involved adding a vertical element to the concrete separator to improve visibility and safety. However, I found it likely to be expensive, potentially lacking durability, and not aligned with the desired aesthetic.

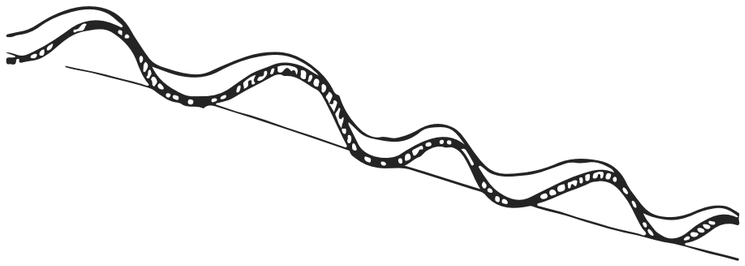
My first revision of the original concept had similar intentions but featured a more streamlined and simplified design that still reflects Wellington's dynamic nature. This option would be a more cost-effective alternative, eliminating the need for a concrete base separator.

The second revision is similar to the first but features two rows of separators to provide a greater buffer space between the cycleway and cars. Having two rows also adds a more dynamic appearance to the separator. I plan to move forward with this design, along with alteration 1, depending on the specific conditions of the street landscape.

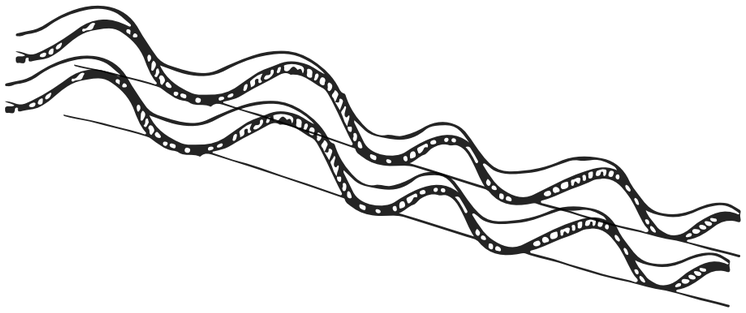
Concept 1

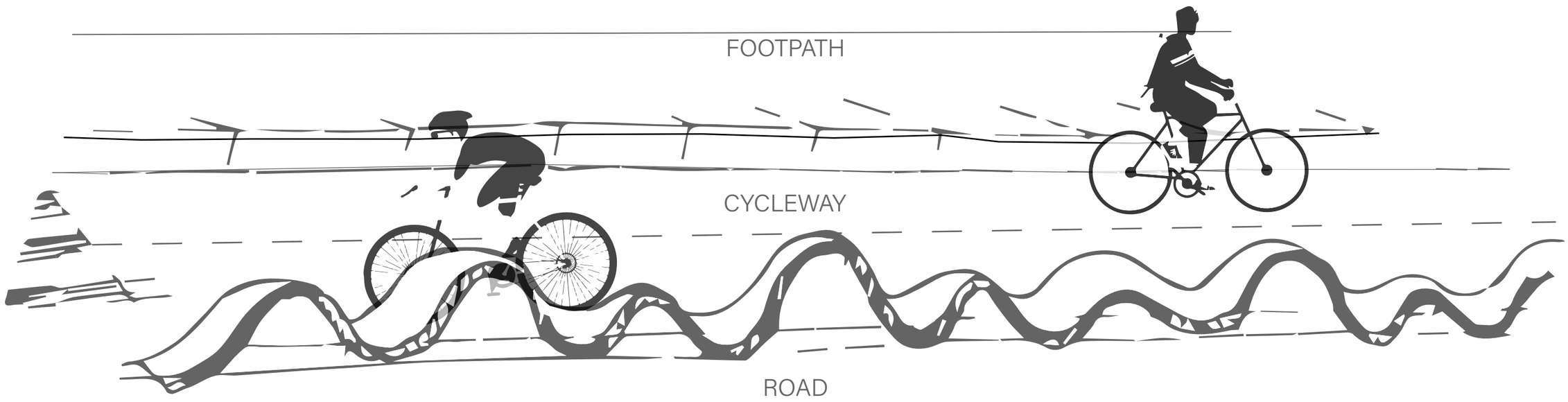


Alteration 1



Alteration 2



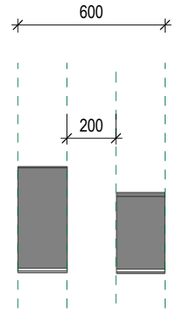


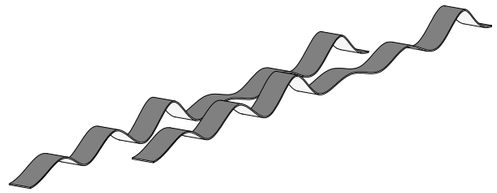
RENDER WITHIN THE CITYSCAPE

This render illustrates my design within the urban fabric, demonstrating how the separator can be modified and adjusted to suit specific street contexts.

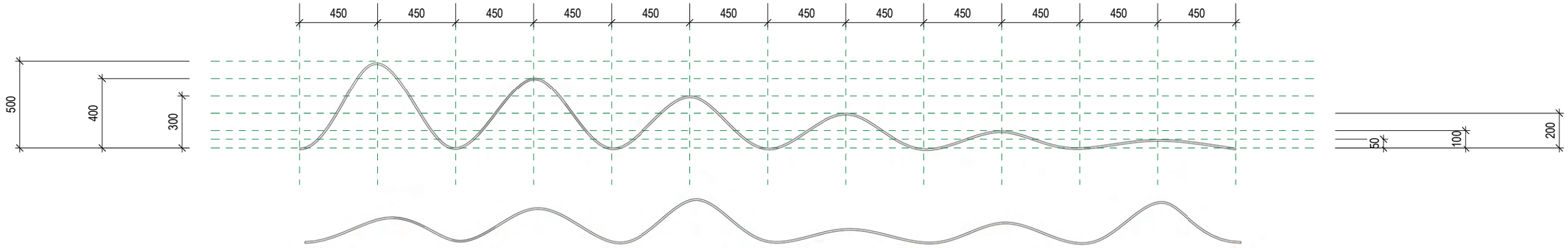
ADAPTABILITY

A key focus in designing this separator was adaptability. Since no two streets are the same, it's crucial that the separator can adjust to different environments and street settings. Existing cycleway separators vary in width and height. For example, larger concrete separators can be up to 600mm wide, while in tighter spaces, rubber separators are only 150mm wide. Given these different circumstances, my separator is 200mm wide. In areas where there's extra space, two separators can be installed with a gap in between, providing an additional buffer between cyclists and cars.





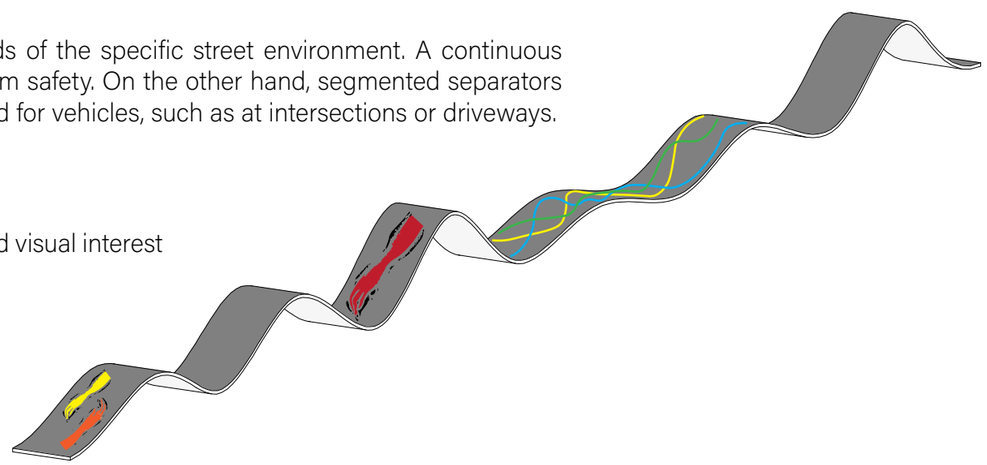
In terms of height, existing separators also vary. With this in mind, my separator can range from 50mm to 500mm above the ground. In places where separation is needed but vehicle access, like rubbish trucks crossing, shouldn't be restricted, a 50mm rubber separator can be installed. Since it's made of rubber, vehicles can drive over it while still maintaining separation. In areas requiring more visible and robust separation, a 500mm height will achieve this.



With concrete separators already installed in parts of the city, I plan to mount my separators on top of these existing structures. This avoids the cost of removing cast concrete separators and repurposes them to the benefit of the city and my design.

The design I've chosen offers flexibility, allowing the separator to be either continuous or segmented, depending on the needs of the specific street environment. A continuous separator provides uninterrupted protection and a clear division between cyclists and vehicles, ideal for areas requiring maximum safety. On the other hand, segmented separators can be strategically placed at intervals, offering flexibility in areas where full separation isn't necessary or where access is required for vehicles, such as at intersections or driveways.

Another opportunity is to engage with the local community by featuring artwork on the separators themselves, adding identity and visual interest to the streetscape.



MATERIALS

Rubber

To ensure my design is sustainable, I selected 5mm thick 60A recycled rubber as the primary material. Although I had difficulty finding a local supplier for recycled rubber strips, I sourced the material from overseas. If the design is developed further, additional investigation into local suppliers can be pursued.

Flexibility and Durability

The rubber is made from 83% recyled rubber and 17% EDPM virgin rubber. With a Shore A hardness of 60, recycled rubber provides a balance between flexibility and toughness. It's firm enough to act as an effective barrier but still flexible enough to handle the stress of impacts, such as vehicles driving over it, without cracking or breaking.

Outdoor Durability

Recycled rubber is generally resistant to weathering, UV exposure, and temperature fluctuations, which makes it ideal for long-term outdoor use. This means the separators will last longer, even in harsh outdoor conditions, reducing the need for frequent replacement or maintenance.

Environmental Sustainability

Using recycled rubber aligns with sustainable design practices by repurposing materials that might otherwise end up in landfills. It reduces the need for new raw materials and minimises the overall carbon footprint of the project, an increasingly important consideration in modern urban planning.

Cost-Effectiveness

Recycled rubber is typically more cost-effective than virgin rubber or other materials like concrete. This helps reduce the overall cost of manufacturing and installing the separators, making the project more budget-friendly without sacrificing quality or performance.

Reflective Tape

I will apply 5mm-wide reflective tape to the side of the rubber facing both the road and the bike path. The tape will not be continuous, but rather in a dashed pattern, similar to how reflectors are typically seen, saving material costs. This ensures that even at night, the separator will be clearly visible to both drivers and cyclists. There is also the opportunity to add reflectors to the top surface of the separator as well. The pricing on the tape I have found is sourced from overseas but could easily be imported or locally produced.

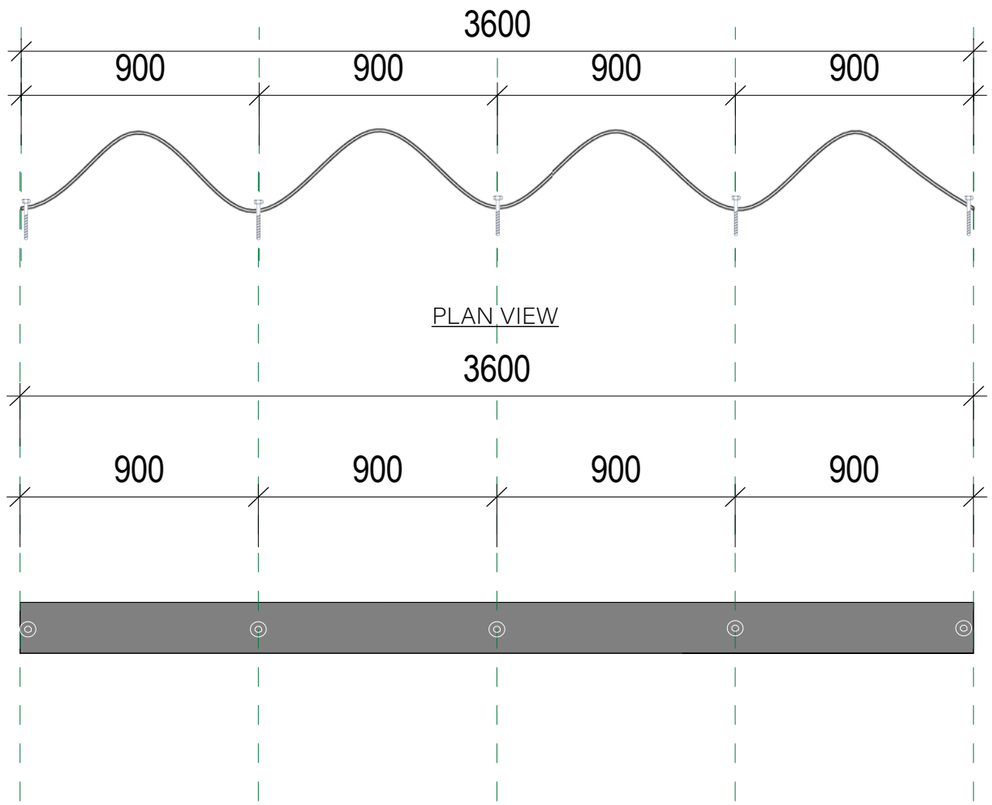
Asphalt Anchor

To secure the rubber to the road, I will use M12x1.75 asphalt anchor screws, along with large washers to ensure the rubber is firmly fastened in place.

COST/CONSTRUCTION

My separator will be fastened to the road at 900mm intervals, which equates to two waves per average bike length of 1800mm. Each separator will be broken up into a horizontal length of 3600mm, allowing individual segments to be replaced if damaged without needing to replace the entire row. The height of the separator will be determined by the amount of material between each fastening point, with more material resulting in a taller separator. A single bolt will be used to secure the rubber to the road at each fastening point, as this should provide sufficient stability. This design prioritises ease of assembly and disassembly, which enhances both its adaptability and cost-effectiveness. The straightforward installation process allows for quick setup, making it efficient to implement in a variety of urban environments. Similarly, its ease of disassembly means that any necessary repairs, adjustments, or relocations can be done with minimal effort and disruption.

ELEVATIONS



PLAN VIEW

The biggest cost for this design will be the rubber material. Since the height of the separator varies, the actual horizontal distance of 3600 mm will change depending on the separator's highest point. For instance, if the separator is 500 mm high, about 7,241 mm of rubber will be required. However, if the height is 50 mm, only around 3,700 mm of rubber would be needed for a segment that is horizontally 3600mm long.

If purchasing rubber in bulk, a 15,000 mm long and 1,200 mm wide piece costs $925 NZD. Since the separator is only 200 mm wide, this material can be cut into strips, significantly reducing costs.

The anchor bolts cost $4 each, with one required every 900mm.

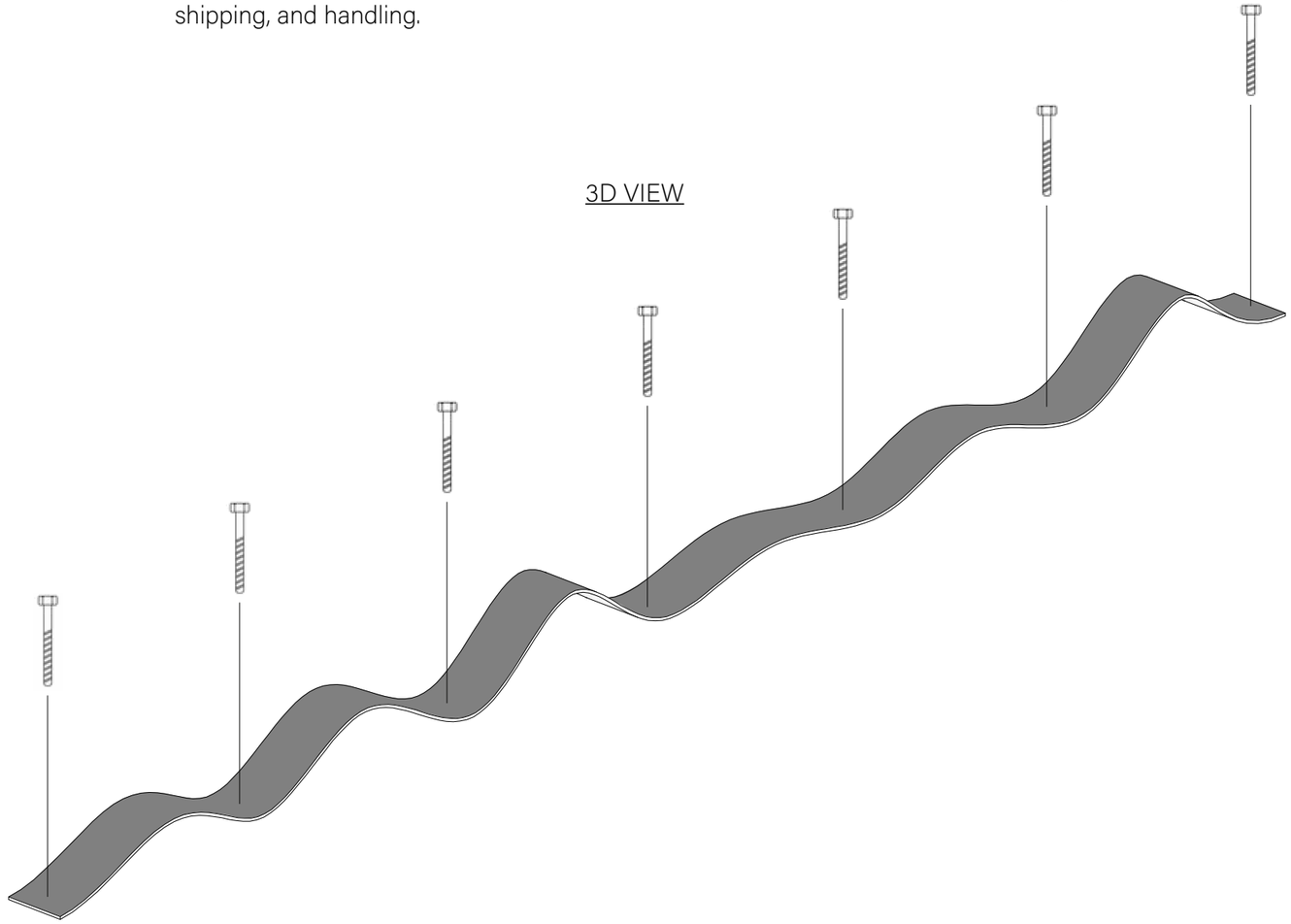
The reflective tape is also very affordable, so I've added $1 for every meter.

Price per meter:

For the tallest separator, the material cost would be approximately $25 per meter, excluding labor, shipping, and handling.

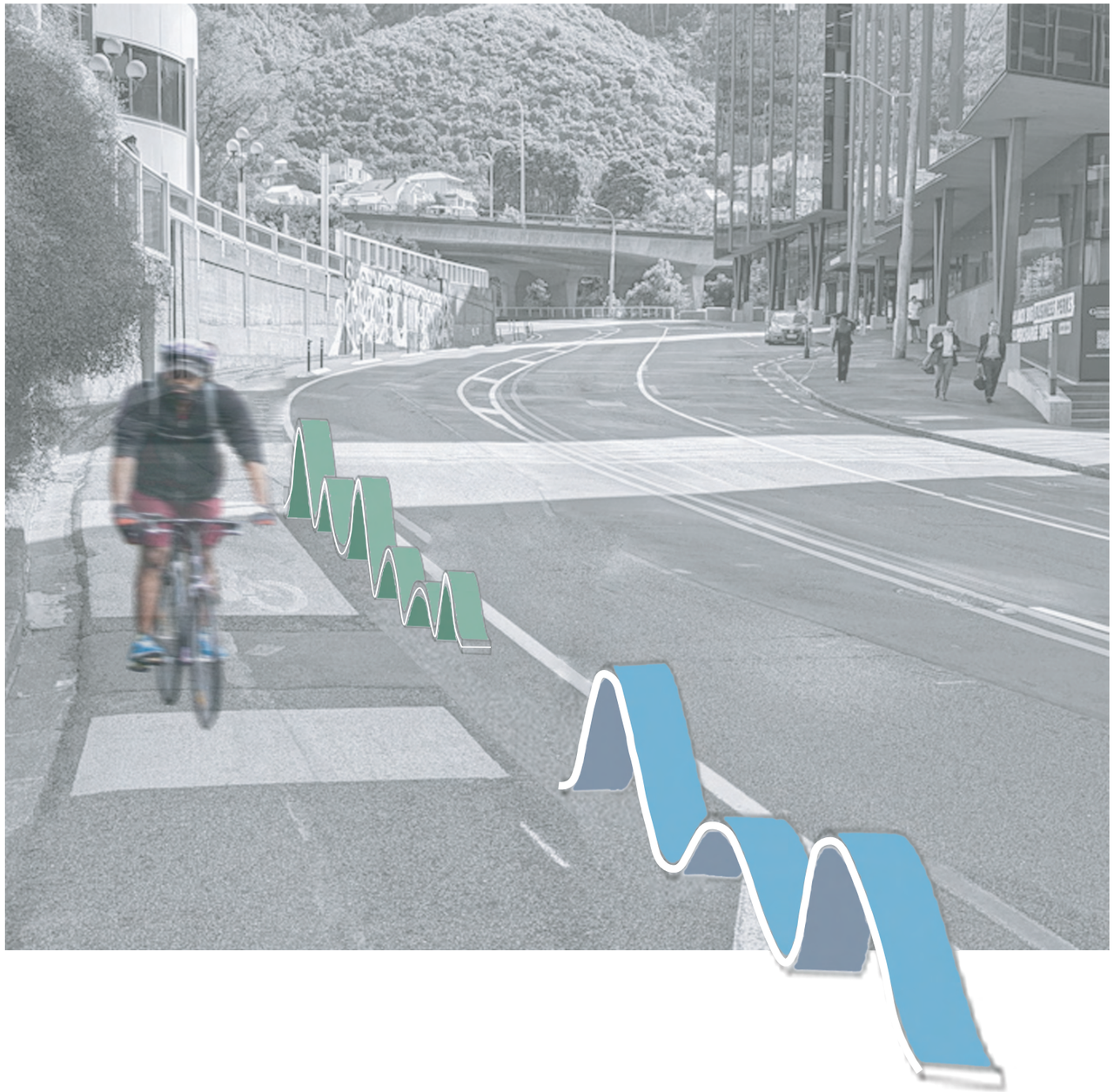
For the shortest separator, the cost would be around $15 per meter, also excluding labor, shipping, and handling.

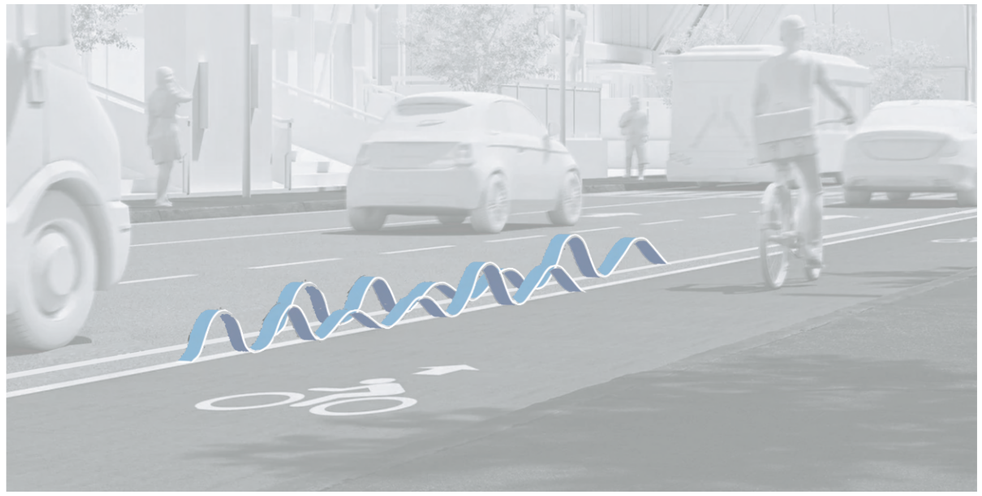
3D VIEW



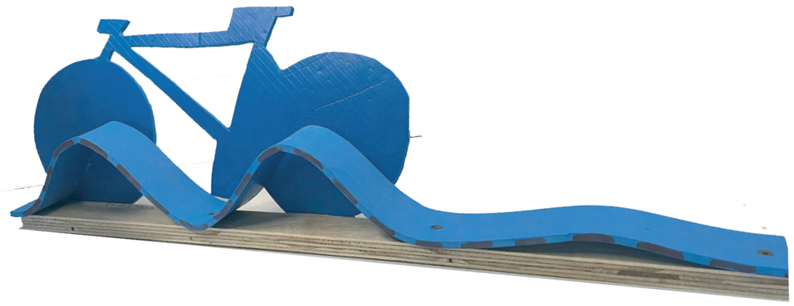
RENDERS WITHIN THE CITYSCAPE

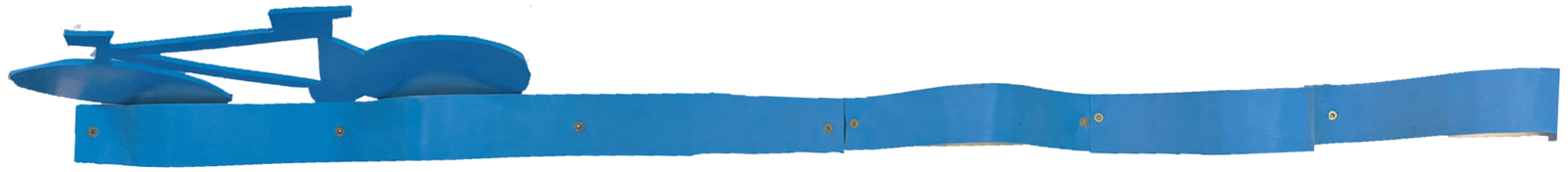
These renders illustrate my design across various conditions within the urban fabric, demonstrating how the separator can be modified and adjusted to suit specific street contexts.





APPENDIX





Thickness	Color	Sizes	Available	Price per Unit	SKU	Quantity
All	All	4ft x 50ft	In Stock Only			
5mm	All Black	4ft x 50ft	In Stock	$580.00	03-100w-sheet-AB-50	
5mm	Blue Steel	4ft x 50ft	In Stock	$675.00	03-100w-sheet-BS-50	
5mm	Blue Dot	4ft x 50ft	In Stock	$675.00	03-100w-sheet-BD-50	
5mm	Green Dot	4ft x 50ft	In Stock	$675.00	03-100w-sheet-GD-50	
5mm	Candy Corn	4ft x 50ft	In Stock	$675.00	03-100w-sheet-CC-50	

Home / Hobby & Craft > Webbing > Reflective Webbings

Width 5mm

Iron On Reflective Heat Transfer Tape - 5mm

ITEM CODE: 8595109561009

£0.18

REFLEX/05

1 ADD TO BASKET ♡ ADD TO WISHLIST

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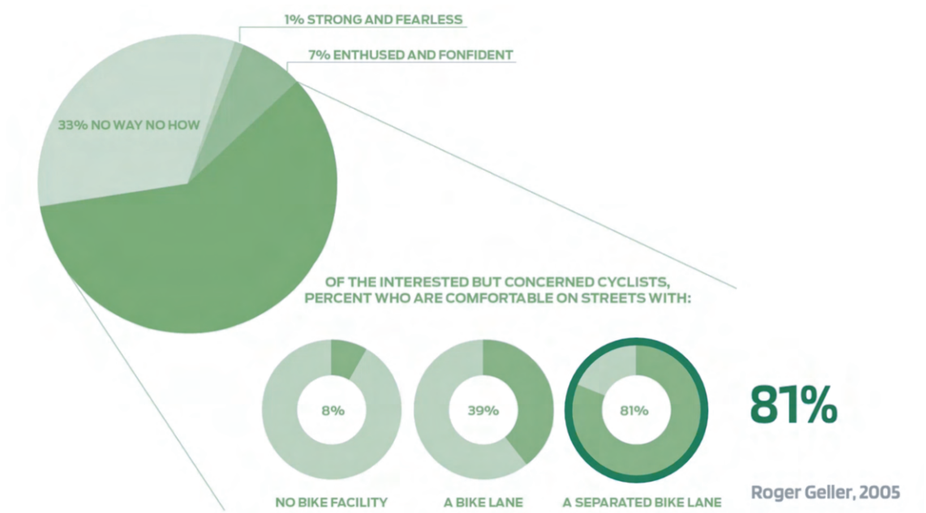

Statistic for Seminar 1

Home / Adhesive Chemical Anchoring / Chembolt – Bitumen Anchor

Chembolt – Bitumen Anchor

Chembolt Bitumen Anchor The removable resin fixing for asphalt.

Chembolt Asphalt fixing system is an economical fast effective fastener with multiple uses for different professions for use with chemical anchoring. Chembolt is a metal anchor bolt with an internal thread which is designed for removable fixings in asphalt, combined with a chemical anchor resin for high durability and ease of fixing.

1 | 12 x 70 mm | Clear

Applications | Advantages

- Parking barriers
- Speed bumps

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