

B1 Route experience

The Western Ring Route – Waterview Connection comprises two distinctive routes. Broadly, SH16 is a ‘coastal highway’ which captures views between the harbour, surrounding hills and distant CBD of Auckland. SH20 dives into and out again of the volcanic landscape at the base of Owairaka. Within each route is a further range – or sequence – of spatial and environmental character zones that reflect the natural and built environment:

SH16 Te Atatu to St Lukes

1. Passing through Te Atatu ridge – urban context disrupted by previous motorway insertion
2. Crossing the Whau – abrupt transition between enclosure and openness
3. Rosebank Domain – Semi-enclosed, ecological area with varying spatial character
4. Rosebank peninsula – elevation promotes harbour views, visual contact with urban form
5. Traherne Island – planting forms a brief transitory enclosure
6. Man-made causeway – expanses of waterscape
7. Harbour edge, Waterview Creek margins – large scale infrastructure meets sensitive ecological area
8. Waterview Interchange to Point Chevalier – enclosure within an urban landscape
9. Point Chevalier to St Lukes - an existing urban centre severed previously by motorway insertion, transition to open space surroundings.

SH20 Mt Roskill to Waterview

10. Tunnel – a dramatic dive into the volcanic landscape
11. Alan Wood Reserve – opening into (or leaving) a green valley with distinctive pedestrian bridges overhead that create an identifiable sense of place
12. Richardson Road and Maioro Interchange bridges – an urban and light industrial setting and a smooth transition to the Mt Roskill highway.

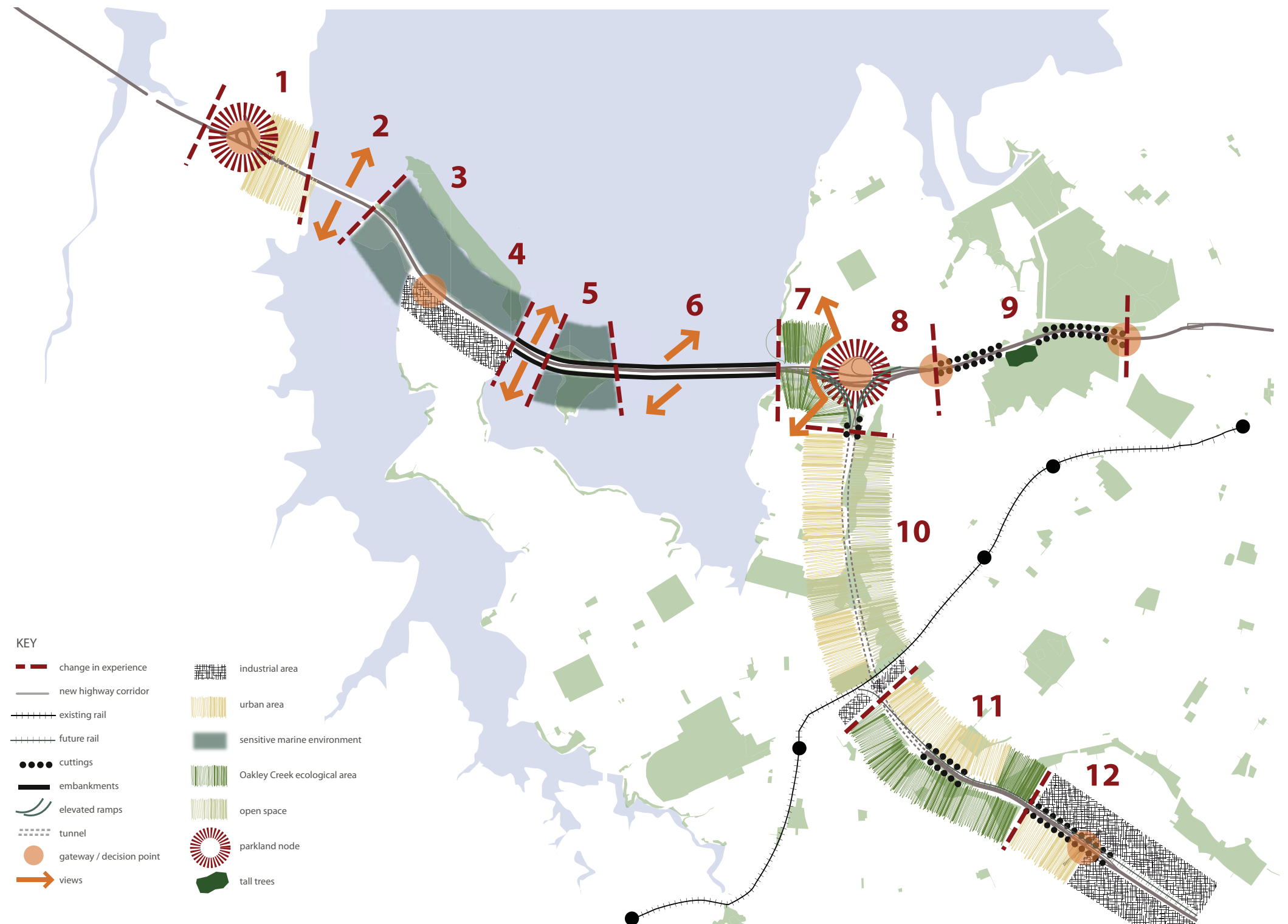


Figure B-1: Route experience

Western Ring Route ► Waterview Connection

B2 Design vision

B2.1 Urban and landscape design vision

The Western Ring Route and Waterview Connection should respond to the unique natural and built landscapes through which they pass, including the sensitive coastal edge, the valleys and volcanic field of the Auckland isthmus, and the local neighbourhoods. The design vision is strongly related to the route experience in seeking to maintain and enhance the positive aspects of the motorway setting, both for its users and the local communities. The motorways should:

- Reinforce the travel sequence of coast, causeway, valley and urban character;
- Connect and re-connect neighbourhoods and public open spaces severed by the corridor;
- Minimise impacts of the project on the surrounding communities;
- Visually relate to their setting in the scale and type of structures and planting; and
- Have structures that contribute positively to the environment, integrate functionality with elegant and refined design, and serve to orient the viewer.

B2.2 NZTA urban design objectives

As a signatory of the New Zealand Urban Design Protocol (2005), NZTA is committed to quality urban design outcomes. This has been translated into the Urban Design Policy (Transit, 2007) with the following objectives:

- Ensure state highways contribute to vibrant, attractive and safe urban and rural areas; and
- Achieve integration between state highways, local roads, public transport, cycling and walking networks and the land uses they serve.

A companion document to the New Zealand Urban Design Protocol is Te Aranga – Maori Cultural Landscape Strategy which seeks to reinstate, develop and articulate the physical and cultural landscapes of whanau, hapu and iwi. This document has informed the development of the Framework.

B2.3 Over-arching urban design principles

The NZ Transport Agency's urban design objectives are the foundation for a set of over-arching principles that have guided the development of the urban and landscape design for this project. These principles, developed in consultation with stakeholders, are:

Design in context:

- Acknowledge the natural and built characteristics of the local area as well as the strategic policy context within which the project sits
- Facilitate opportunities to enhance the local communities and the quality of the surrounding natural and built environment.

Respect for heritage:

- Recognise natural, cultural and built heritage features in the design proposals in a manner that preserves their integrity and meaning
- Promote the sensitive protection and preservation of the natural landscape, including rock formations that identify the Auckland volcanic field.

Identity and distinctiveness:

- Reflect and contribute to the identity of the area
- Respond to the distinctive features of the surrounding coastal edge, waterways, parkland and urban areas
- Provide panoramic and focussed views to hills, harbour and the Auckland CBD
- Create new gateway or landmark features sympathetic with the local character

Connectivity:

- Enable connectivity by all modes of movement (walking, cycling, public transport, private vehicle)
- Consolidate and connect areas of open space to 'heal' the currently fragmented network
- Facilitate opportunities for safety improvements and for integration with other projects.

Respect for the natural environment:

- Prioritise low impact design and environmentally responsive solutions
- Minimise the ecological impacts of the project and return optimum ecological conditions to the local catchment.
- Facilitate opportunities for well designed public open spaces and connectivity between green spaces.

Quality Design:

- Design and build structures and surrounding spaces to a high standard.

Public safety and security:

- Consider CPTED (Crime Prevention Through Environmental Design), road safety, noise exposure and accessibility for the mobility impaired in the selection and development of design solutions.

Development opportunities:

- Seek to maintain and enable the development potential of the adjacent land.

Value for money:

- Use cost effective design solutions.
- Provide the best long term practical solution to stormwater treatment of the motorway

Users' experience:

- Design the motorway landscape and structures to present motorway users – and users of adjacent spaces – with a coherent, interesting and visually pleasant environment.

B3 Existing design themes

Auckland's volcanic field shapes much of the character for the Western Ring Route. This is one of two high-level themes that characterise the Western Ring Route to the south and west. The other theme is the 'green route' which informs the design of SH16.

B3.1 The 'green route' – SH16

- Theming for SH16 supports Waitakere City's aspirations for an eco-corridor, and Auckland City's desire for SH16 east of Waterview to be treated as an urban forest. The focus of the green route is on intensive planting of native species, including vertical 'green walls'.

B3.2 The 'volcanic highway' – SH20

- The volcanic features along the SH20 route have been identified as a "significant landmark features for local Iwi and the Auckland people" that "inform the nature and character of the SH20 alignment" (MHX Urban Design Masterplan)
- The Hopua tuff ring south of this project and the Avondale Heights tunnel in Sector 8 are those parts of SH20 where the experience of the volcanic landscape is potentially at its most dramatic
- The volcanic landscape is interpreted through the landscape and structures design to capture the experience of moving through the volcano and 'diving into' the lava flow.

Section B ▶ Design vision and principles

B4 Design concepts

B4.1 SH16 Design Concept

This design seeks to reinforce the existing harbour landscape, particularly the experience of traversing wide open spaces, water and coastal escarpments. Figure B-17 is a summary diagram of the landscape design concept, showing the sequence of views and edge conditions that constitute the route experience.

B4.1.1 SH16 Design inspiration

The design concept is grounded in the challenges of the project, including the need to protect the corridor against projected sea level rise, the constraints created by existing structures, and a sensitive ecological setting. Works will strengthen character by minimising the visual impact of elements in the landscape, using attractive finishes to enhance the environment and achieving cohesion of finishes across a range of furniture and structures.

The following key principles informed the design:

- Celebrate the coastal experience
 - Maximise notable extensive views of the CBD skyline, harbour, Waitakeres and volcanic cones from the motorway
 - Sensitively treat structures and details, and frame views
 - Minimise the visual impact of motorway elements in the landscape
- Create landscape gateways
 - Strengthen the relationship between the harbour flats, the Isthmus and West Auckland
 - Accentuate natural gateways between coastal edges and interchanges
 - Dense drifts of Pohutukawa and coastal plants on along the whole route
- Appropriately scale the design
 - Respond to the large scale of the landscape and existing structures
- Promote continuity
 - Achieve cohesion with other parts of the WRR through use of similar finishes and colours
- Use materials, finishes and colours that give a distinctive identity to the route
 - Use subtle and ‘recessive’ concrete finishes when viewed from a distance, using dark aggregate texture for close-up interest and human scale
 - Use colour emphasis on cycleway bridges to highlight this route
 - Use colour and material to emphasise Te Atatu overbridge as part of an urban ‘gateway’
 - Use attractive finishes to enhance the environment
 - Achieve cohesion of finishes across the range of furniture and structures.

Earthworks on SH16 also contribute to the design concept and existing landscape by:

- Forming ground profiles to increase enclosure or a sense of openness, while meeting engineering requirements and protecting the route from sea levels
- Replicating the scale, slope and shape characteristics of the existing landscape where space permits; or using steep or trapezoidal forms where it does not
- Adding variety or enhancement to the landscape where planting cannot be undertaken
- Elevating screen plantings
- Reducing the size and scale of other structures to a human scale (eg noise walls).

B4.1.2 SH16 Design palette

Images that show the palette of colours, plants, materials, and forms and textures that illustrate these design principles for SH16 are shown in Figures B-3–B-5.

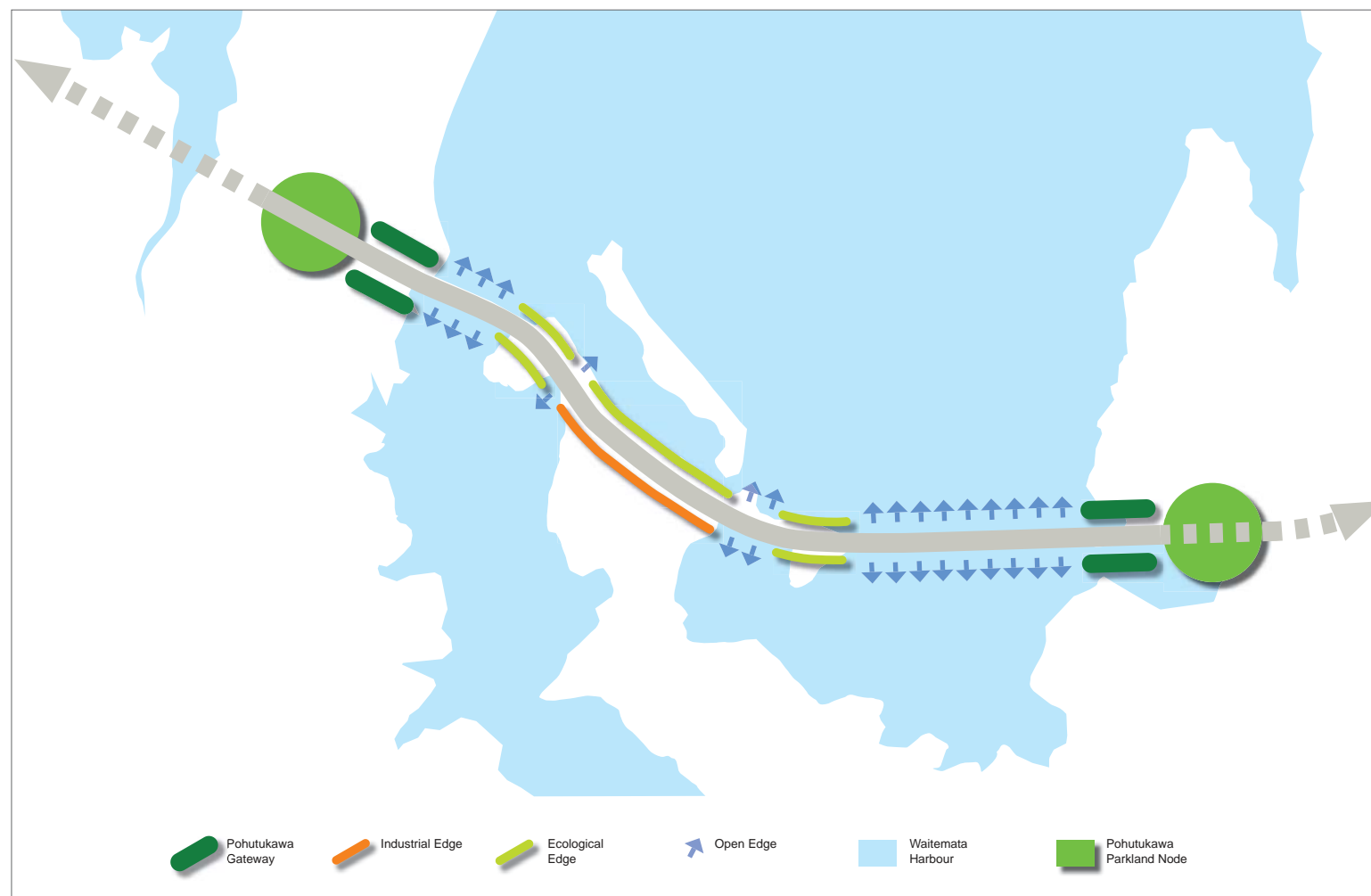


Figure B-2: SH16 landscape design concept

Western Ring Route ▶ Waterview Connection

Forms (below) are strong, simple and predominantly horizontal, reflecting the large scale of the landscape and existing structures, and allowing attention to focus on expansive, interrupted views.

Patterns and finishes employ finer textures that provide interest to the pedestrian close up.

Te Atatu Overbridge is an element in the urban landscape and is treated as a gateway element.

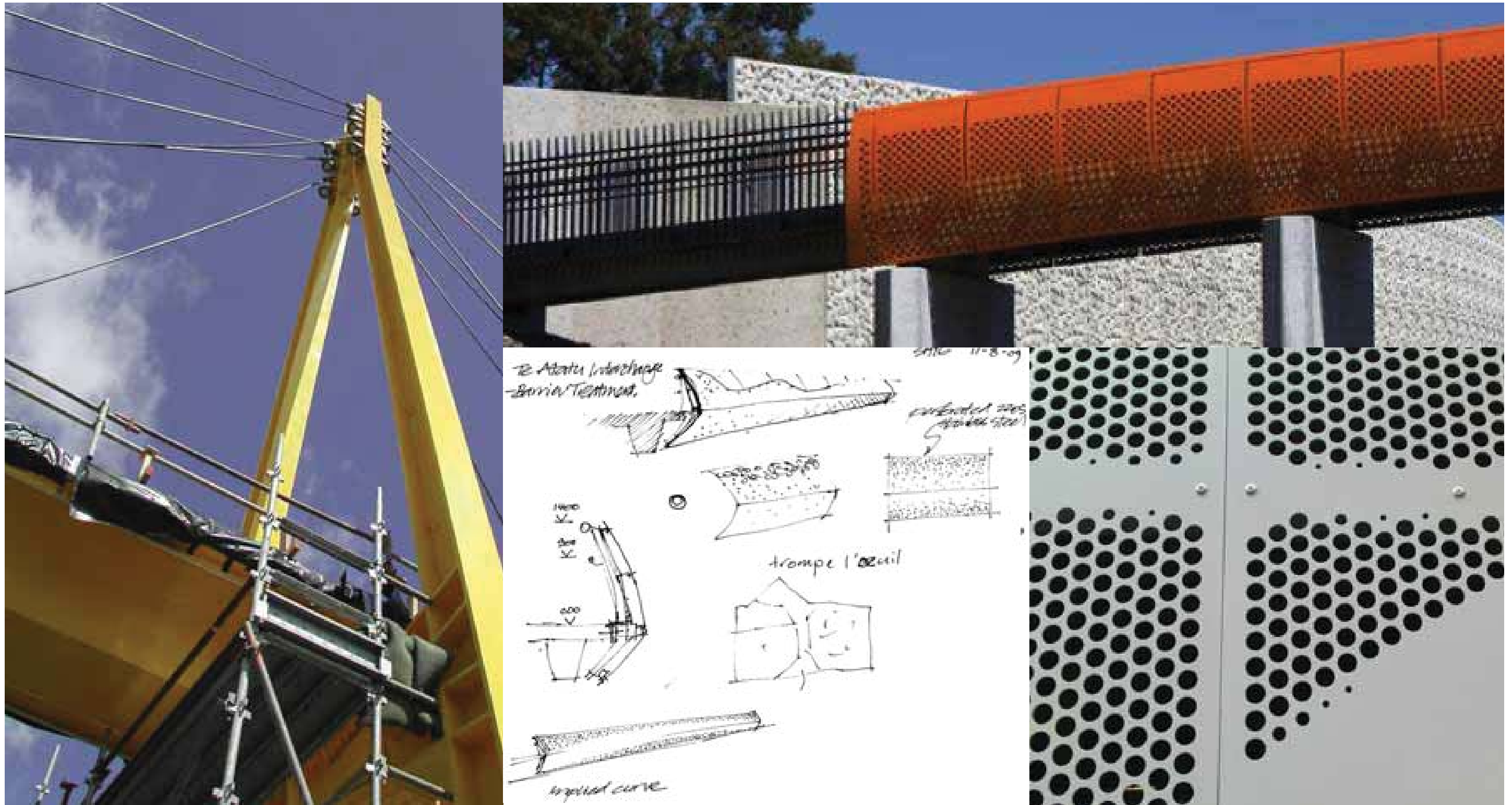


Figure B-3: SH16 Design palette: forms, patterns and finishes

Section B ▶ Design vision and principles

The planting palette is predominantly native coastal species, with the vivid red of dense drifts of pohutukawa providing a contrast at important gateways.

Plant size and form reflects the existing condition, with lower scale planting along the causeway and the trees providing height and a transition in scale to the larger motorway elements at key interchanges.

The images below capture the characteristic planting that the concept design seeks to draw on.



Figure B-4: SH16 Design palette: planting

Western Ring Route ▶ Waterview Connection

An 'earthy' palette with solid, unadorned materials should be used to anchor the wall elements in the landscape. The coastal character of marbled, sandy surfaces is interpreted through exposed aggregates, rough surface textures, and repeated patterns.

In contrast the built structures - bridges - are steel, finished and coloured to highlight their function and their role in orienting users of the route.



Figure B-5: SH16 Design palette: materials and textures

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B4.2 SH20 Design Concept

The alignment travels through a landform that has been shaped by its volcanic history. The design seeks to highlight and complement the volcanic landscape it traverses, including key landforms and associated cultural responses. Figure B-6 is a summary diagram of the sequence of edge conditions that will distinguish this part of the route.

B4.2.1 SH20 Design inspiration

The design concept draws on the area's unique natural and cultural history, and seeks to harness and reference the natural processes that formed the landscape. The design also addresses the need to mitigate motorway impacts on public open space, at the same time aiming to provide a high amenity, high quality environment for both passive and active recreation, reconnecting areas that will be severed by the motorway, and where possible enabling linkages to other open spaces beyond the corridor.

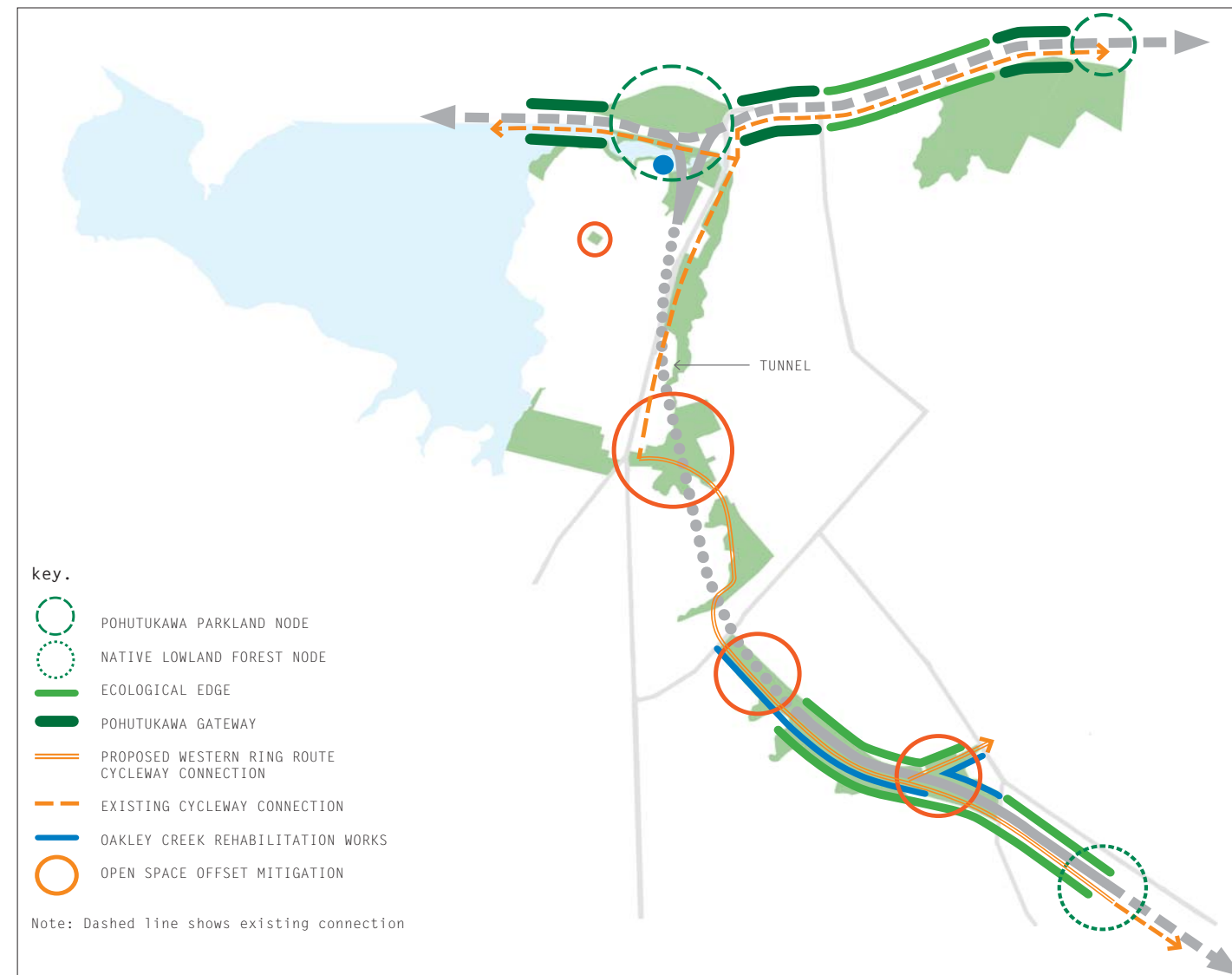


Figure B-6: SH20 landscape design concept

The following key principles have informed the design:

- Celebrate the volcanic experience
 - Enhance, celebrate and frame views to volcanic cones
 - Terrace the landform sculpturally to evoke volcanic flow and movement
- Define the journey stages and gateways
 - Use landscape to create a pohutukawa node / gateway at the Waterview Interchange
 - Design the tunnel portals to provide a strong sense of the changing experience on entering the tunnel
- Appropriately scale the design
 - Respond to the scale of the urban environment, particularly when introducing a new motorway corridor through open space and residential neighbourhoods
- Promote continuity
 - Design structures (bridges, retaining and noise walls) to relate to the existing SH20 volcanic highway themes and to link into the SH16 coastal themes
- Use materials, finishes and colours that give a distinctive identity to the route
 - Keep materials predominantly natural and unadorned, with texture exposed wherever possible as elements have been carved from the land
 - Employ dark background colours to reference the underlying basalt of the lava field, with vividly coloured highlights as a contrast – similar to lava cooling under a solid crust.
 - Select endemic planting whose foliage provides bright greens to contrast against the dark background.

4.2.2 SH20 Design palette

Images that show the palette of colours, plants, materials, and forms and textures that illustrate these design principles for SH20 are shown in Figures B-7 –B-10.

Western Ring Route ▶ Waterview Connection

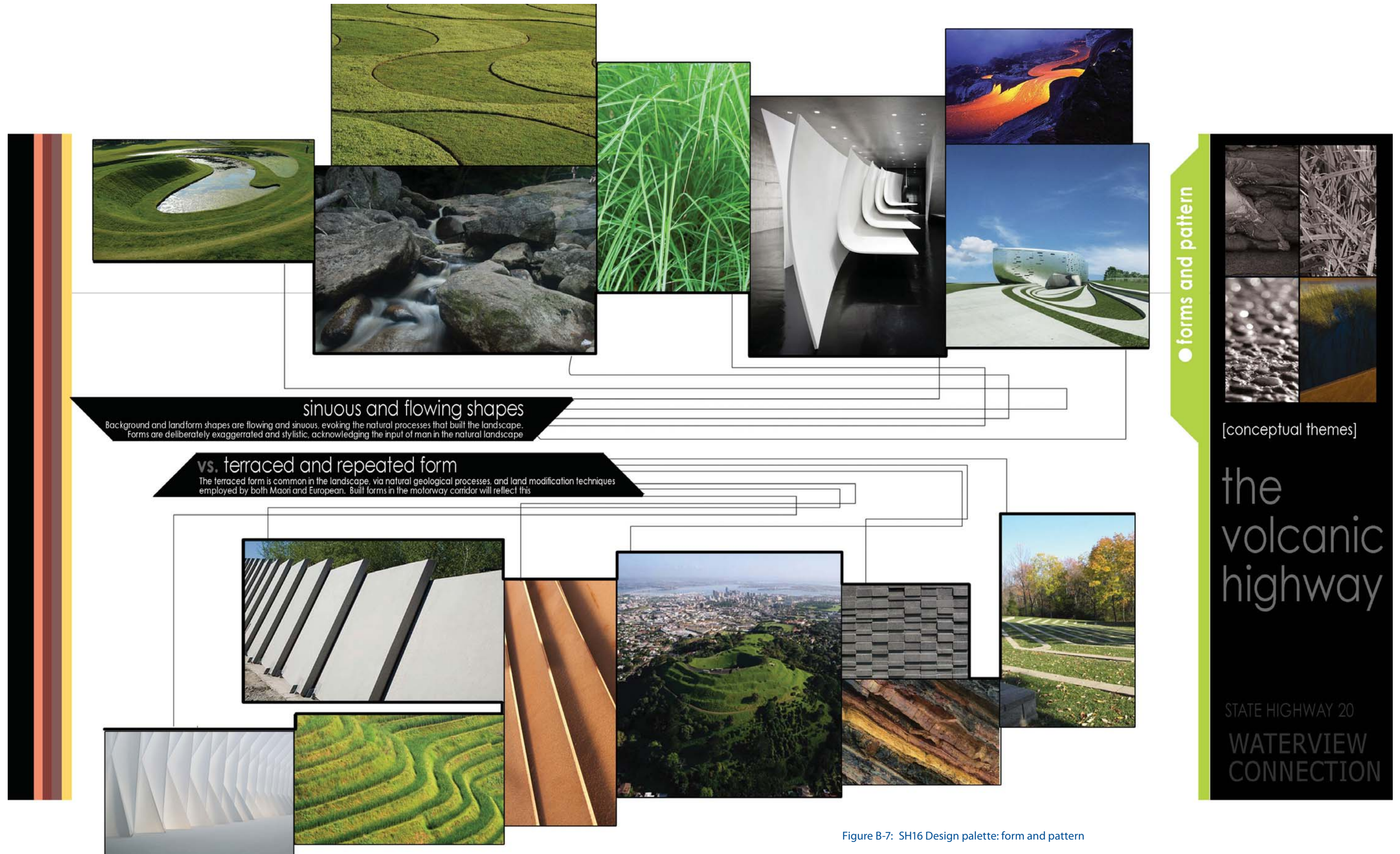


Figure B-7: SH16 Design palette: form and pattern

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Figure B-8: SH16 Design palette: planting

Western Ring Route ▶ Waterview Connection

textured, solid and layered
 Textures and materials appear hewn from the earth, solid where connected with ground planes, with natural textures such as aggregates exposed. Materials generally unadorned and presented in their natural form

vs. light, fluid and permeable
 The solid, dense and 'earth-based' materials adjacent to the motorway itself will be contrasted by much lighter structures such as glass and steel as built form rises away from the ground plane

materiality

[conceptual themes]

the volcanic highway

STATE HIGHWAY 20
 WATERVIEW CONNECTION

Figure B-9: SH16 Design palette: materials

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monochromatic base
shades of black and charcoal provide a recessive and sophisticated base, against which colour can be effectively used. The hue is culturally relevant and evokes the basalt sub-strata of the land

vs. splashes of colour
carefully limited use of bright colour will be used to strikingly contrast against the dark background matrix of colour. The dark background will serve to make colours used in detailing and planting appear more vivid

[conceptual themes]

the volcanic highway

STATE HIGHWAY 20
WATERVIEW CONNECTION

● colour palette

Figure B-10: SH16 Design palette: colour

Western Ring Route ► Waterview Connection

B5 Corridor-wide design principles

B5.1 Ecological Principles

Oakley Creek Rehabilitation

Ecological principles were developed by members of the wider project team and integrate landscape, urban design, ecology and hydraulics considerations. They support the rehabilitation of the creek in a comprehensive 'whole of stream' approach that encompasses both riparian restoration and recreation of in-stream habitat, and will result in significant native restoration around the Waterview interchange and associated creek margins.

These principles are consistent with the 'NZTA Western Ring Route - Oakley Creek realignment and rehabilitation guidelines' developed as a separate document. Together they have guided the landscape and planting design concepts.

Key ecological principles that underpin the landscape design philosophy are:

Landscape Connections and Public Access

- Establish functional linkages and ecological connections between habitat types
- Ensure that stream edge planting and its relation to park layout generally meets ACC CPTED guidelines
- Provide legible open space linkages and viewpoints
- Place the majority of pedestrian options outside of the 100 year floodplain but provide occasional stream-edge walkway options
- Place bridges as necessary to ensure landscape connections
- Celebrate stream features with associated open space areas.

Landscape and Ecology Values

- Optimise natural character and landscape amenity values for the stream corridor and its associated open space
- Restore native vegetation communities in the stream corridor
- Provide for functional, diverse and representative riparian habitats
- Retain and enhance significant in-stream features, such as rock cascades and pools
- Avoid safety fences through appropriate design responses to embankments and open water
- Retain remnants of the basalt channel structure as appropriate for heritage values; or limit rehabilitation of channelised sections to areas where hydraulic, landscape or ecological gains are significant.

Streambank Morphology

- Restore channelised sections of the stream with an appropriate natural bank profile
- Retain natural stream profiles to the extent practicable between proposed SH20 extent and Oakley Creek
- Allow for a cross sectional profile that resembles a natural staged channel, including a permanent flow channel, stream banks based on the two year event, and associated floodplains and berms to hold the 100 year event
- Apply erosion control measures using an adapted stream profile and biotechnical construction techniques.

Stream Diversion

- Limit the extent of stream diversion to the extent practicable
- Provide for increased functional values of diverted streams (according to SEV criteria)
- Design for no net loss of functional stream value following mitigation.

In-stream Habitat

- Restore representative in-stream heterogeneity where appropriate (pool, riffle and run)
- Align in-stream habitat restoration with hydraulic objectives for erosion control, conveyance, and grade change
- Provide fish passage for existing and potential native fish populations
- Preserve groundwater inflows and prevent 'leaking' to artificial drainage.

Water Quality

- Integrate proposed stormwater management with natural stream environments to connect them visually and ecologically, if not hydrologically
- Investigate options for in-stream water quality treatment
- Identify opportunities to daylight natural channels or form treatment filter strips at pipe outlets to the stream
- Design stream buffers to prevent contaminant spills.

Planting

- Plant stream margins, banks and floodplain areas to achieve the objectives of ARC's Riparian Zone Management Guidelines (TP148)
- Provide for appropriate naturalised planting to adjacent property boundaries while retaining passive surveillance of park environments.

Construction

- Provide for appropriate staging and construction techniques to avoid potential impacts to downstream environments and in-stream aquatic habitat
- Utilise innovative biotechnical construction to restore a natural streambank morphology.

Harbour / coastal rehabilitation

Landscape Connections and Public Access

- Extend and connect existing landscape habitats, such as coastal escarpment characters, within the corridor where opportunity exists
- Provide additional local connections from Rosebank onto the cycleway route, increasing recreation access for workers
- Continue to provide managed rather than uncontrolled public access to sensitive ecological areas in the marine reserve.

Landscape and ecology values

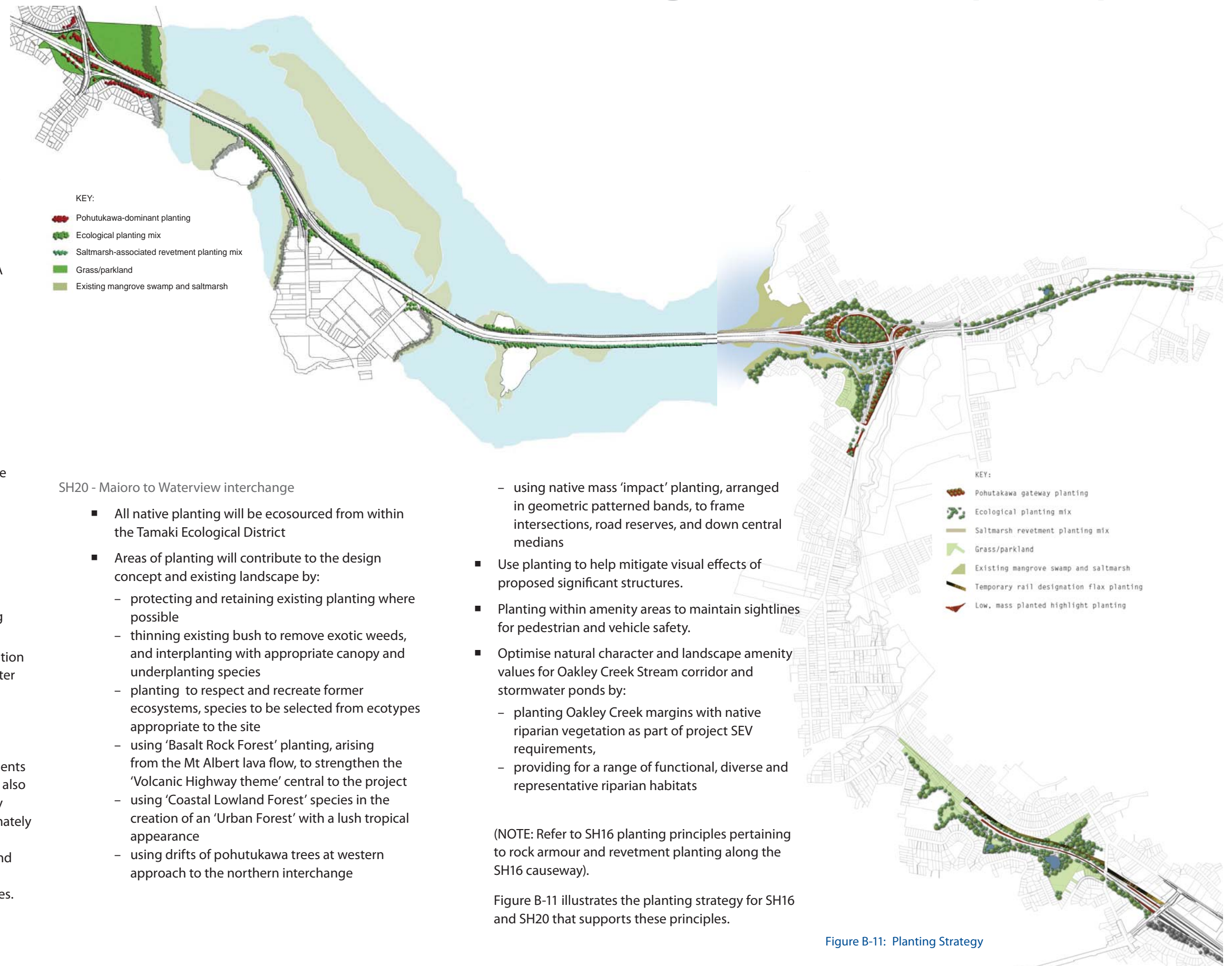
- Ensure that structures and landform modification, such as the widened causeway and bridges, support ecological systems by providing enhanced stormwater treatment
- Encouraging ecological colonisation of structures such as the coastal armour by including plantings.

Section B ▶ Design vision and principles

B5.2 Planting principles

SH16 – Te Atatu to St Lukes

- Areas of planting will contribute to the design concept and existing landscape by:
 - protecting and retaining existing planting where possible
 - using eco-sourced species native to the site where possible
 - using extensive drifts of Pohutukawa
 - being consistent with the Traherne Natural Heritage Restoration Plan currently under preparation (a joint initiative between NZTA and DoC)
- Where works occur on Traherne Island, additional plantings will be required. Aggressive weed species shall be removed. All work in these areas will be undertaken in coordination with a qualified terrestrial and freshwater ecologist
- Native plants affected by works will be reused on Traherne Island
- A maintenance and management plan must be provided for the design
- Planting will be provided to suit any relevant designation or resource consent conditions
- Filter strip areas adjacent to the highway are proposed to be planted with alternatives to common grass, subject to consent approval. These planting areas will achieve the following requirements:
 - they should not impede the effective operation of the drainage function provided by the filter strip area
 - they should provide for a low-maintenance installation which does not require regular cutting or other treatments
 - they should be classified as “frangible” elements for the purposes of ensuring the filter strips also provide a “clear zone” adjacent the highway
 - they should not grow higher than approximately one metre
 - they should not pose a barrier to walking and vehicle access in case of emergencies
 - they should preferably include native species.



SH20 - Maoro to Waterview interchange

- All native planting will be ecosourced from within the Tamaki Ecological District
- Areas of planting will contribute to the design concept and existing landscape by:
 - protecting and retaining existing planting where possible
 - thinning existing bush to remove exotic weeds, and interplanting with appropriate canopy and underplanting species
 - planting to respect and recreate former ecosystems, species to be selected from ecotypes appropriate to the site
 - using ‘Basalt Rock Forest’ planting, arising from the Mt Albert lava flow, to strengthen the ‘Volcanic Highway theme’ central to the project
 - using ‘Coastal Lowland Forest’ species in the creation of an ‘Urban Forest’ with a lush tropical appearance
 - using drifts of pohutukawa trees at western approach to the northern interchange

- using native mass ‘impact’ planting, arranged in geometric patterned bands, to frame intersections, road reserves, and down central medians

- Use planting to help mitigate visual effects of proposed significant structures.
- Planting within amenity areas to maintain sightlines for pedestrian and vehicle safety.
- Optimise natural character and landscape amenity values for Oakley Creek Stream corridor and stormwater ponds by:
 - planting Oakley Creek margins with native riparian vegetation as part of project SEV requirements,
 - providing for a range of functional, diverse and representative riparian habitats

(NOTE: Refer to SH16 planting principles pertaining to rock armour and revegetation planting along the SH16 causeway).

Figure B-11 illustrates the planting strategy for SH16 and SH20 that supports these principles.

Figure B-11: Planting Strategy

Western Ring Route ▶ Waterview Connection

B5.3 Bridge design principles

B5.3.1 Road bridges

The following design principles apply to road bridges on the project:

- Design bridges to reflect their local context, including their visibility from the motorway and from the surrounding community and open spaces
- Design bridges to be recognisable as part of the Western Ring Route 'family', with individual variations reflecting the requirements of their specific settings (ie the SH20 volcanic concept and the SH16 green route)
- Because the Maioro and Richardson Road bridges are close together and highly visible from the motorway they will be experienced and should be designed as a 'pair'. Maintain a central pier for both the Maioro and Richardson Road bridges to provide continuity with the Mt Roskill section
- Balance the structural elements to minimise the bridge profile and create a simple, elegant whole.
- Make the bridge as slender and open as possible to reinforce the horizontality of the structure
- Design the barrier as a strong, simple form, whose surface texture creates a play of light and shade. Abstract, repetitive patterns are suitable to add interest while not distracting drivers. Form barrier elements above 800mm high in metal rail
- Integrate the parapet and balustrade design so that this part of the bridge presents a unified appearance and reads as one element
- Where the corridor is constrained, particularly against the travelling lanes, carefully design and detail closed abutments to present a high quality finished appearance
- Structures that eliminate the need for headstocks and enable simple, elegant column or pier design are preferred: these could include wall type piers, haunched girders or tapered piers
- Integrate lighting and drainage with the structure, leaving the external surfaces of the bridge free of drainage pipes or services, and the draining system concealed from all views. Incorporate vandalism protection with lighting design and selection.

B5.3.2 Pedestrian / cycle bridges

The following design principles apply to pedestrian / cycle bridges on the project:

- Locate pedestrian bridges to support pedestrian desire lines and flow paths and to connect into the regional cycle and walking network
- Design pedestrian bridges to be consistent in form and appearance with each other, within the constraints of their different locations and structural imperatives
- Ensure that bridges are fully accessible and that where ramps are used, they are incorporated into the existing topography and open space areas, and their slope minimised. The paths of travel for ramps and stairs should be as close as possible
- Integrate bridges into the surrounding open space context as far as possible. This includes relating to the character and scale of the surrounding landscape and urban form
- Keep the length of the bridge as short as possible and viewlines as open and direct as possible, to
 - promote the safety and security of bridge users
 - achieve a balance between using the natural topography to minimise the incline (of approach or the bridge itself) and reducing the span.
- Design bridges to create a high amenity environment for cyclists and pedestrian, and one that feels comfortable and safe to use, by providing sufficient width for two-way traffic without creating a feeling of 'tightness' for users, particularly when passing others
- Select long-life, durable materials and finishes that do not significantly degrade in appearance over time
- Apply anti-graffiti coating as part of the bridge construction phase to prevent patchy application and appearance at later stages
- Develop a lighting plan for each structure, to promote night time use and to create a feature for drivers along the highway, with the detailed design
- No signs are to be placed on pedestrian / cycle bridges, and gantries should be located to minimise their visual impact on all bridges and other highway structures.

B5.3.3 Ramps and piers

- Design ramps to present a coherent experience, including where they will be highly visible from underneath. A smooth, flowing profile is preferred
- Minimise the number of piers landing in sensitive ecological and archaeological areas, and where future pedestrian / cycle ways are to be located
- Where there is sufficient room to form the land around ramps, mound up to minimise the amount of supporting structure and visually bring the ground closer to the ramp (thus reducing the appearance of height).

B5.4 Tunnel, portals, ventilation buildings and stacks design principles

The tunnel portals are the thresholds between the above and below ground sections of the motorway and different driving environments for road users. The design of the tunnel and portals should contribute to road safety, driver behaviour, integration with the surrounding urban area and visual interest for road users. Attention to the architectural detailing and material selection as well as the bulk and massing of these elements is critical to their successful integration in the surrounding urban and landscape setting.

- Design the northern and southern portal to reflect their different settings and approaches: in particular celebrate the experience of 'entering the volcano' at the southern portal with the use of strong elements and materials that evoke the basalt which the tunnel is diving into
- Locate stacks at or as close to the tunnel portal as possible so that their function is easily understood and they 'announce' the tunnel entries
- Take advantage of the double skin construction to design the outer skin of the stack in a way that adds visual interest, reinforces a sense of place, and ties in to the design of the tunnel approaches
- Ensure that the portal design allows for a transition from external light levels to the lower internal light levels of the tunnel

- Where possible, bury the large ventilation buildings below ground level and create a useable space above them. Where it is not possible to submerge all or part of the ventilation buildings:
 - screen them from or integrate with surrounding residential or community uses with bunding and / or planting
 - locate and design them to respect the pattern of surrounding development. Minimise the area taken up by parking, and locate parking and servicing away from the street edge and screened from residential properties.
 - consider integrating them with other buildings or structures to provide for different functions and to group built form together
 - make a positive contribution to the surrounding environment, for example by positioning windows to overlook public spaces.
 - design them to the minimum dimensions required for their function
 - integrate their design with the portal and stack.
- Design the tunnel interior to reinforce a clear, safe path of travel, maintain driver attention through varying a combination of tunnel geometry, spatial form and lighting, and to create a pleasant driving experience distinctive from that of the open road.

Section B ▶ Design vision and principles

B5.5 Noise walls design principles

Noise walls are integrated with the design of the overall corridor and complement the motorway structures, landscaping and roadscape elements. The design inspiration for the form of noise and retaining walls is in the overlapping or terracing of the landscape revealed through geology and through land modification. The noise wall concepts reference both geology and engineered topography. Detailed design should give effect to these guiding concepts by reinforcing the noise wall principles for this project.

The noise wall principles are:

- Consider alternatives to the use of noise walls, including quiet road surfaces, the use of buildings as noise barriers and bunding. Also consider limiting the height of noise walls to balance noise and visual impacts
- Recognise that noise walls are seen from adjacent land uses as well as from the motorway and design them to be 'double-sided', contributing positively to the amenity of residents and open space users
- Design walls with a horizontal emphasis, offsetting joints to create a somewhat informal, random appearance
- All walls are to be designed to have 'thickness' so that they appear as sculptural elements in the landscape. For SH16, use a related design with face finishes and delineation that evokes the geological strata (refer Figure B-27). For SH20, wall type 1 builds on the 'volcanic highway' theme with overlapping, contrasting materials and textures that present a comparatively heavy appearance (refer Figure B-28, B-30 and B-31). Wall type 2 (Figure B-29, B-32 and B-33) is a retrofit of the existing timber noise walls at Maioro, enlivening them with colour that also relates to the volcanic theme palette
- Where walls step or change direction, allow them to overlap to terminate rather than butting them up against each other. At the same time, minimise the change in horizontal alignment so as not to create abrupt shifts along the top edges

- Materials should be of high quality, and long-lasting (minimum 50 year life), preferably concrete pre-cast panels mounted on semi-concealed steel posts. For SH20, dark, 'scorched' colours will be enlivened with red / orange / gold tones between the panels; for SH16, green posts between panels will reinforce the green route concept
- Locate noise walls behind crash barriers, with planting at the base both to soften the appearance and to bring strong highlight planting colour against the darker background
- Where appropriate, planting should be used to soften and enhance the appearance of the walls
- Applied artwork ('stuck on' elements) is not suitable for the design of noise walls in this project.

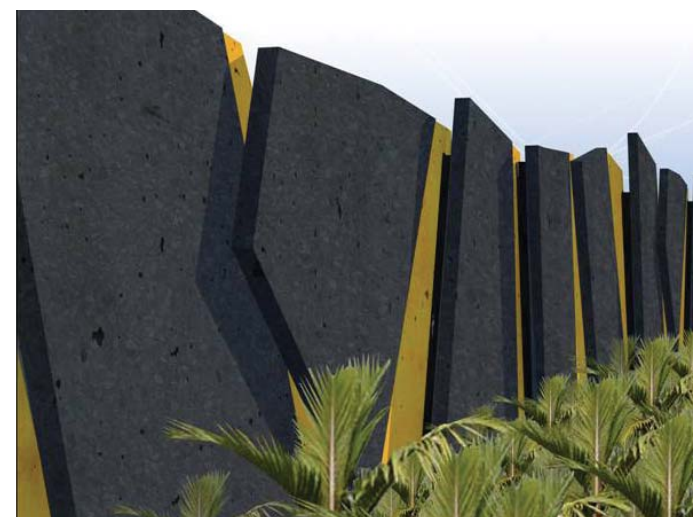


Figure B-13: SH20 Noise wall concept – wall type 1



Figure B-12: SH16 Noise wall concept

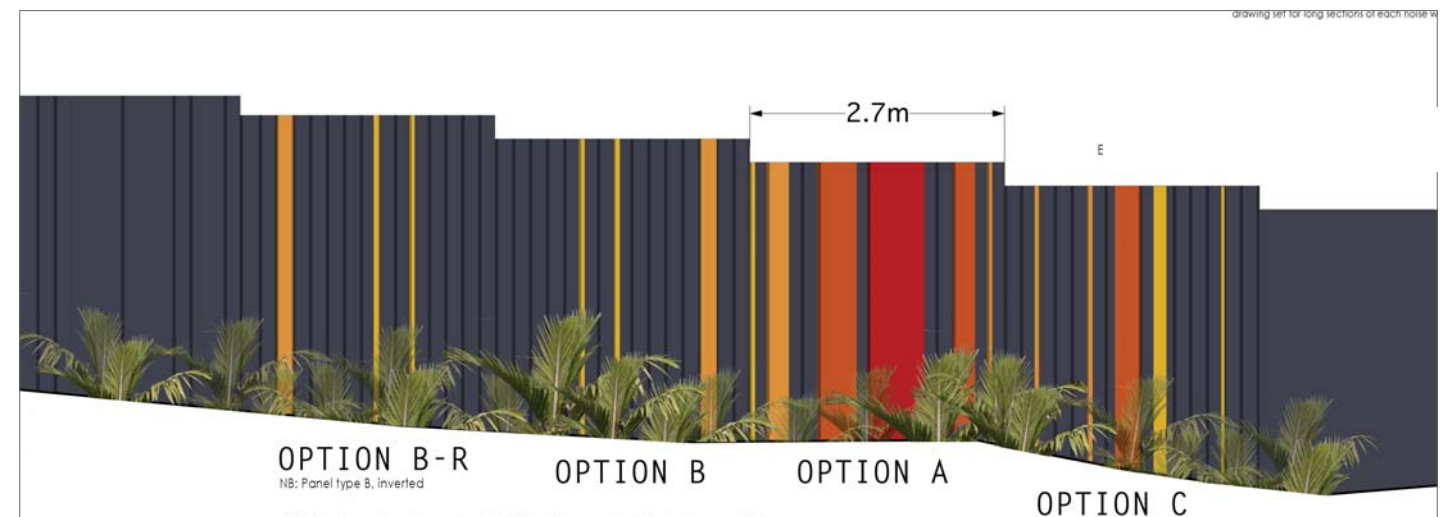


Figure B-14: SH20 Noise wall concept – wall type 2

Western Ring Route ▶ Waterview Connection

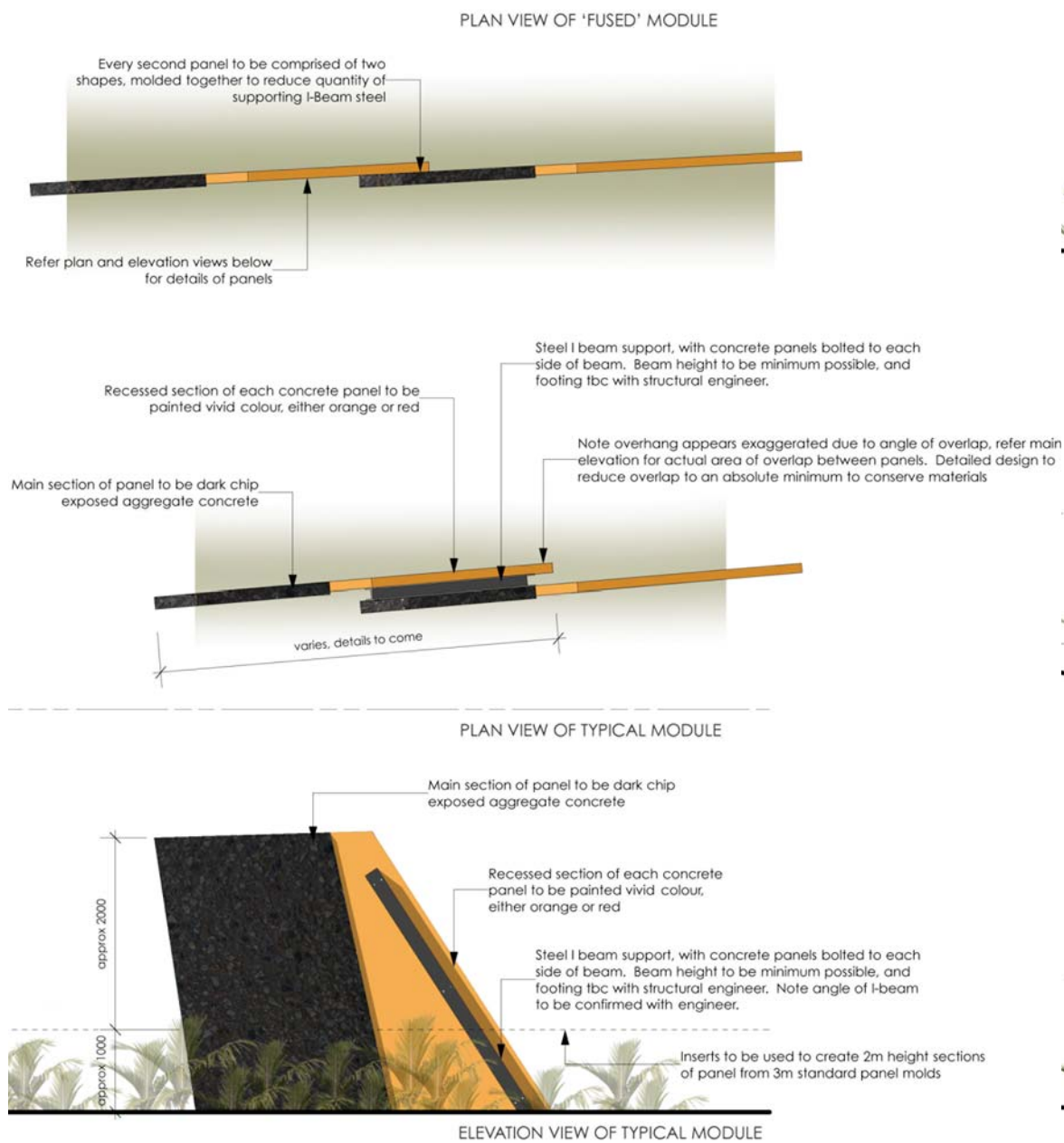


Figure B-15: SH20 Noise wall type 1 – plan and elevation

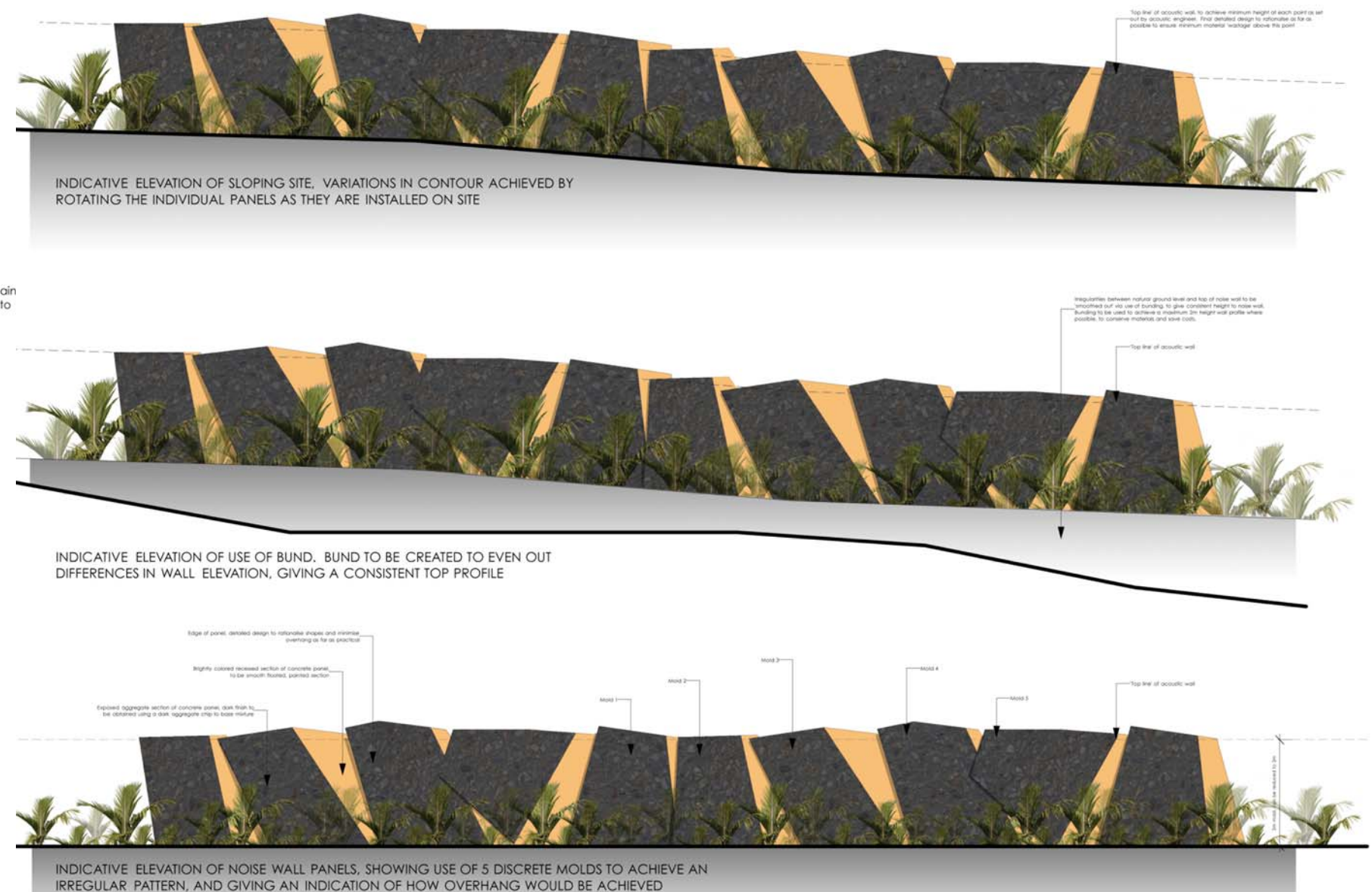


Figure B-16: SH20 Noise wall type 1 – long elevations

Section B ▶ Design vision and principles

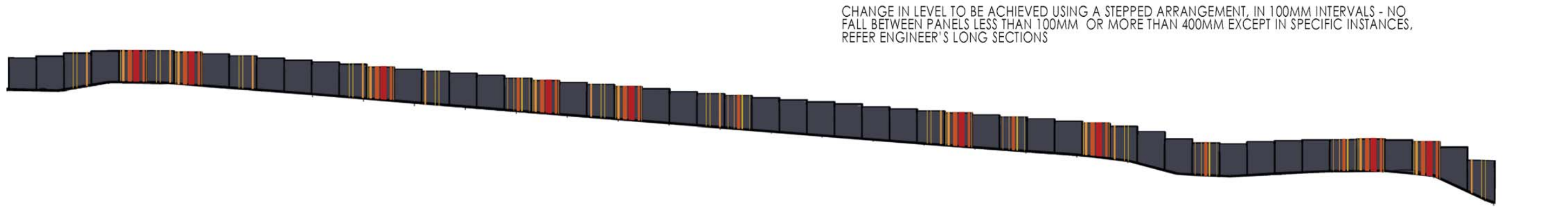


Figure B-17: SH20 Noise wall type 2– long elevations

INDICATIVE LONG SECTION SHOWING SPACING AND TYPICAL RHYTHM OF PANEL TYPES. NB NOISE WALL 3 IS EXAMPLE SHOWN
Refer also sheet L-5700-006 for cladding details and engineers drawing set for long sections of each noise wall

KEY

	Resene 'DeI Toro'
	Resene 'Chilean Fire'
	Resene 'California'
	Resene 'Supernova'
	Resene 'Nero'

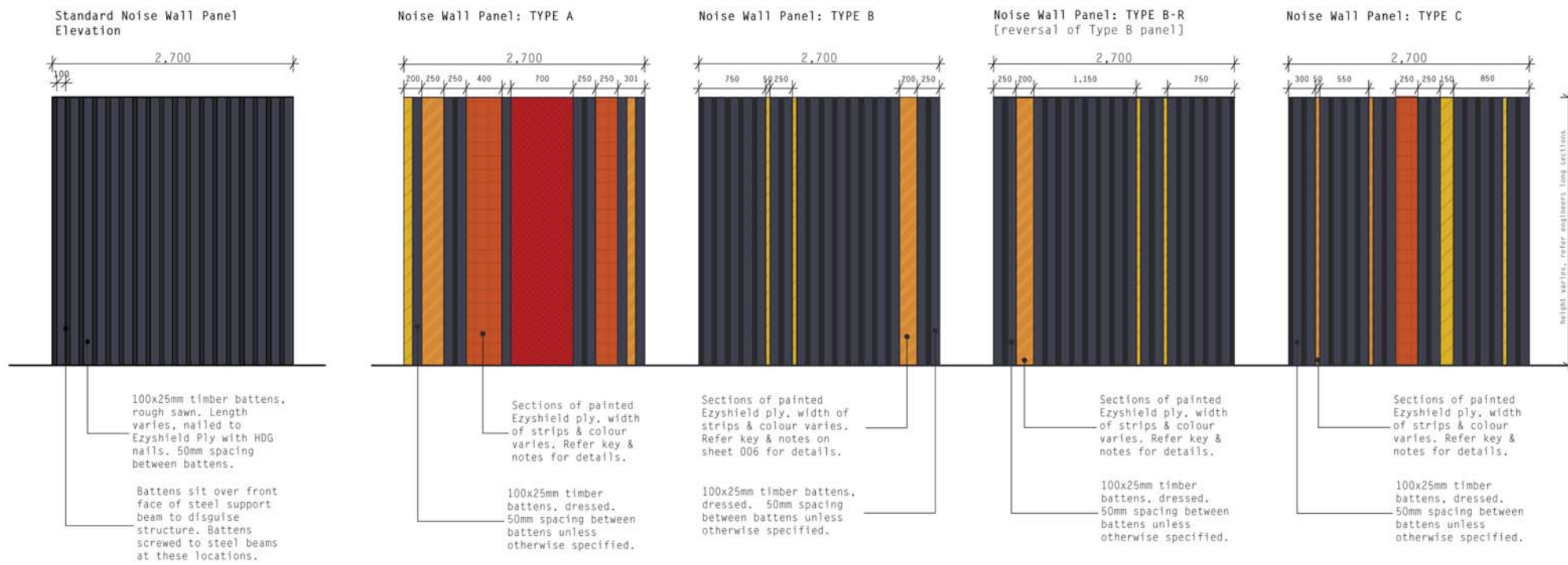


Figure B-18: SH20 Noise wall type 2– panel options

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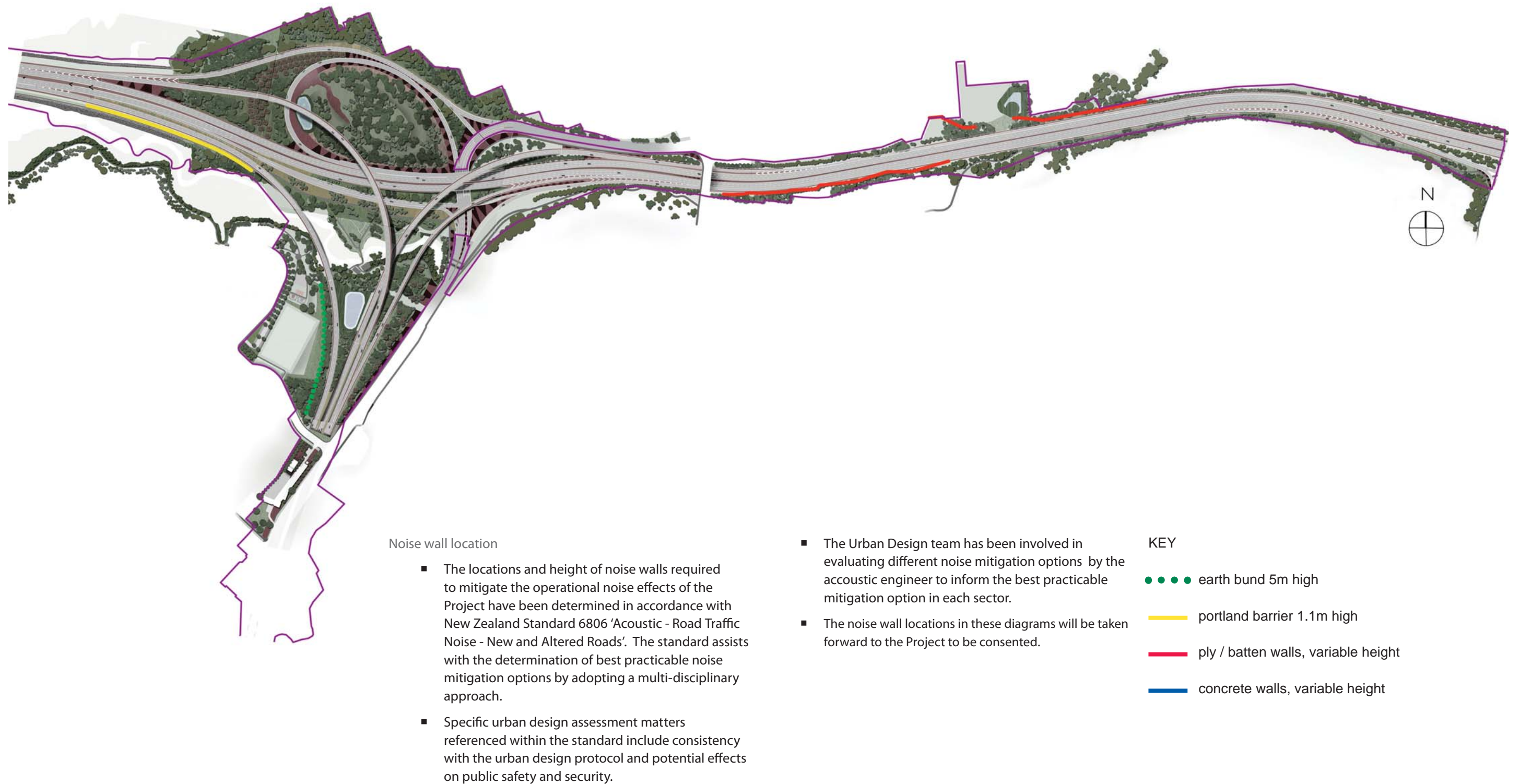
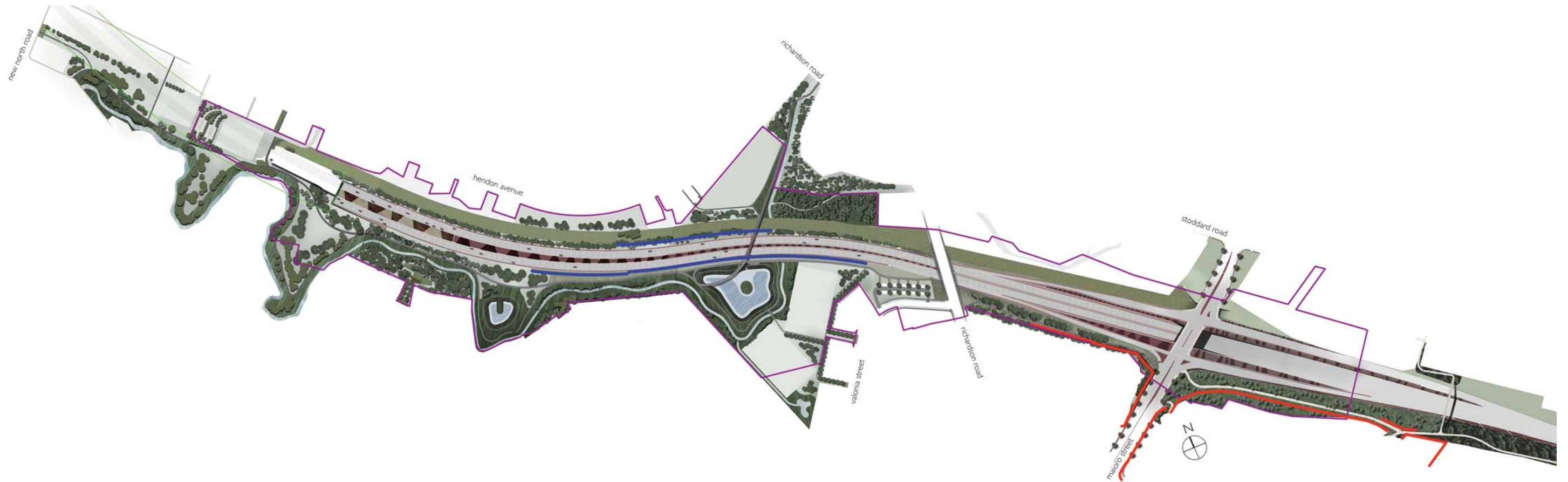


Figure B-19: Location and type of noise walls, Sectors 5, 6 and 7

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KEY

- ● ● ● earth bund 5m high
- portland barrier 1.1m high
- ply / batten walls, variable height
- concrete walls, variable height

Figure B-20: Location and type of noise walls, Sectors 8 and 9

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B5.6 Retaining walls design principles

The retaining wall design for SH16 and SH20 differs to reflect the different settings and existing motorway context. The design principles are:

In general

- Establish and reinforce connections to the existing highways (SH18 and SH20 Hillsborough-Mt Roskill section)
- Visually integrate the retaining wall materials and finishes with the landscape design and the design of bridge structures, with any shared paths and the immediate highway context
- Detail and finish the retaining walls to create a consistent 'language' with the noise walls on the project
- Design retaining walls with a predominantly horizontal emphasis, or 'ground' them in the landscape by means of heavier, more deeply etched or darker materials at the base
- Use landscaping where possible to reduce the visual impact and perceived mass of the retaining walls
- Design safety barriers and fencing to be integral with the wall, aligning joints and posts, and locating fixings so as not to compromise the appearance of the wall to the motorway users.

SH16 retaining walls

- Concrete retaining panels on SH16 should match those on SH18, with exposed dark aggregate and subtle horizontal corrugations which seek to complement rather than compete with the harbour landscape (refer Figure B-21).

SH20 retaining walls

- Design retaining walls on SH20 to reflect the materials and colours suggested by the 'volcanic landscape' theme, for example through the use of basalt harvested during tunnel construction
- Colours are predominantly dark with strong contrasting splashes of 'fire' colour (red, dark orange, gold)
- Retaining walls at the portals are to be integrated with the portal design, for consistency and a 'wrap around' effect that emphasises the approach to the tunnel.



Figure B-21: SH16 retaining wall concept

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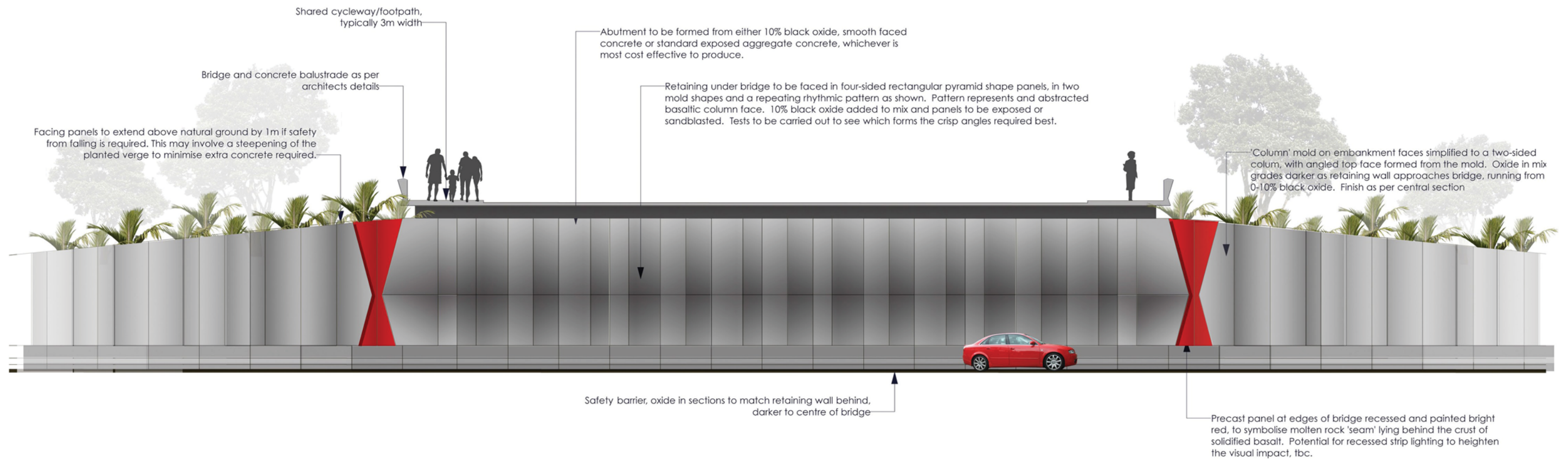


Figure B-22: SH20 retaining wall concept

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- Precast panels under Maioro and Richardson Road bridges (Refer Figure B-22 and B-23) have been designed with recessed sections painted red to symbolise the rock 'seam' lying behind the crust of solidified basalt. Their profile is relatively simple with a vertical emphasis, relating strongly to the barrier design that represents the 'fractured' appearance of solidified magma without detracting from its impact. The red colour distinguishes the 'bridge experience' for drivers from the rest of the motorway.
- Three panels with subtly different emphasis (Figure B-22, below right) enable considerable variety in the planes of the retaining wall over the length of the wall, while at the same time providing a simple, cost effective profile to construct and install.

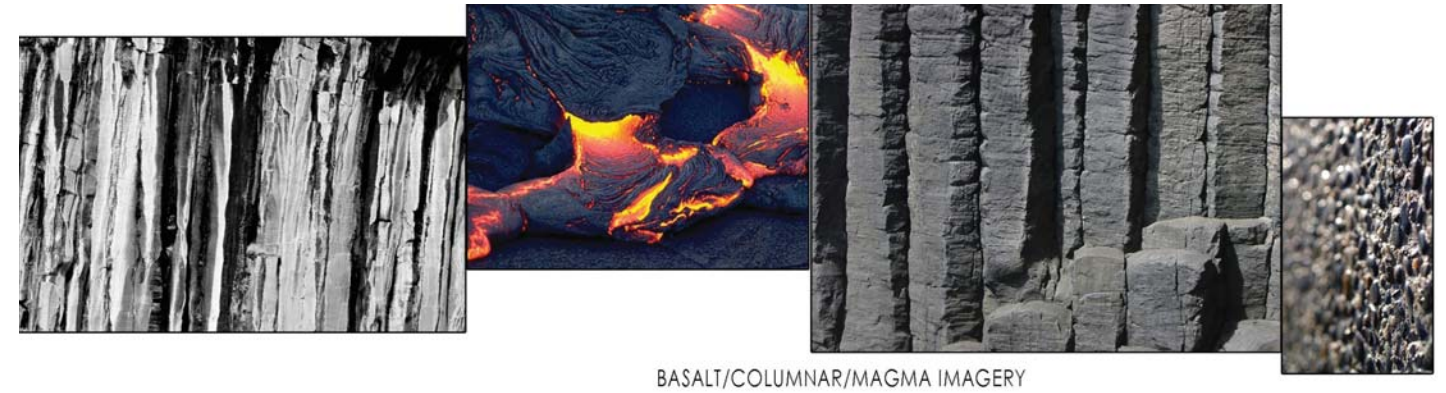


Figure B-24: SH20 materials inspiration

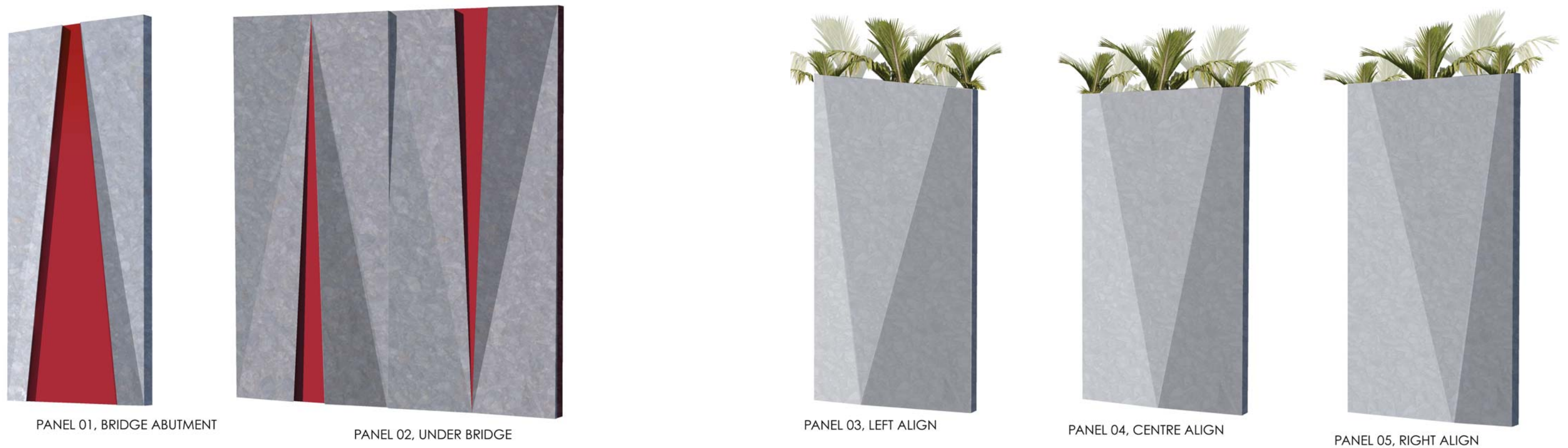


Figure B-23: SH20 retaining wall profiles

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B5.7 Highway furniture design principles

In general

- Keep the size and number of elements to the minimum permitted by engineering design standards and by combining elements (eg. lighting and signage support) when safety permits
- Coordinate the design of roadscape elements with the design of major structures such as portals, bridges and ramps
- Use anti-graffiti paint across the range of structures and furniture, ensuring that the full extent of elements is covered to avoid a patchy appearance in the event of damage and cleaning or repainting.

Lighting

- Minimise the impact of lighting on surrounding neighbourhoods by screening glare from lights
- Generally locate lighting columns in the central median, with additional columns in shoulder areas around interchanges. Low-energy lighting is required, with LED lamps preferred where they can be demonstrated to achieve acceptable performance and meet maintenance requirements
- On SH16 columns between interchanges will be plain galvanized finish while lighting columns at interchanges will be treated with black paint finish. On SH20 all columns will be painted black
- SH16 cycleway lighting will be consistent with cycleway lighting on the Mt Roskill section of SH20.

Gantries and signage

- Signage should be combined onto fewer mounting posts and into fewer sign panels wherever possible
- Signs are not to be mounted on pedestrian / cycle bridges. Signage on road bridges should be limited to the names of the local road, in a format integrated with the design of the bridge barrier
- If existing round modular pipe sign gantries on SH16 are to be retained they shall be painted black
- Gantries for electronic messaging signs will be based on the wide-span, slim girder pattern already used in Auckland Central Motorway Junction and modified to improve their appearance and to deter casual access. Designs should also minimise the visual impact of these structures on views

- All new gantry units are to meet these performance requirements:
 - All steel elements should be specified to achieve extended durability in a marine environment
 - All coating systems are to match specifications used on structural bridge elements and provide long-term durability in a marine environment
 - All units shall be painted black
 - Potential for corrosion is to be minimised through formation of structural elements to reduce trapping of water on horizontal surfaces
 - Support posts are to be as slender as possible
 - Spanning girder elements are to be sized to minimise their vertical depth, and minimise the visual impact of diagonal elements
 - All signage should be visually contained within the depth of the spanning girder, through integrated design of girders and signage panels.
 - No signage should extend above or below the girder. Signage for road users is not permitted to be mounted on support posts.

Barriers

- Clear zones will replace barriers where possible, particularly on the causeway, enabling better views. Where clear zones are not possible, 'New Jersey' concrete barriers will be used to provide adequate protection in case of vehicles leaving the carriageway
- On bridges, any barrier element above 800mm high will be formed in metal rail.

Fencing

- On SH16, highway fencing will be 1.4m high welded mesh 'pool fence' with folded edges, finished with black polyester powder coat (refer Figures B-24–25)
- On SH20, fencing will be a black mesh (chain) fence with steel posts and top rail finished in black (refer Figure B-26).

Seating

- On SH16 informal seating will be provided on the causeway along the cycleway at approx. 300m centres and near the Whau in the form of 500mm high rocks matching the type used in the adjacent coastal armour.



Figure B-25: Visualisation: black finishes to corridor furniture



Figure B-26: Artist's impression of retaining wall, fence, noise walls, lighting and signage gantry – SH16

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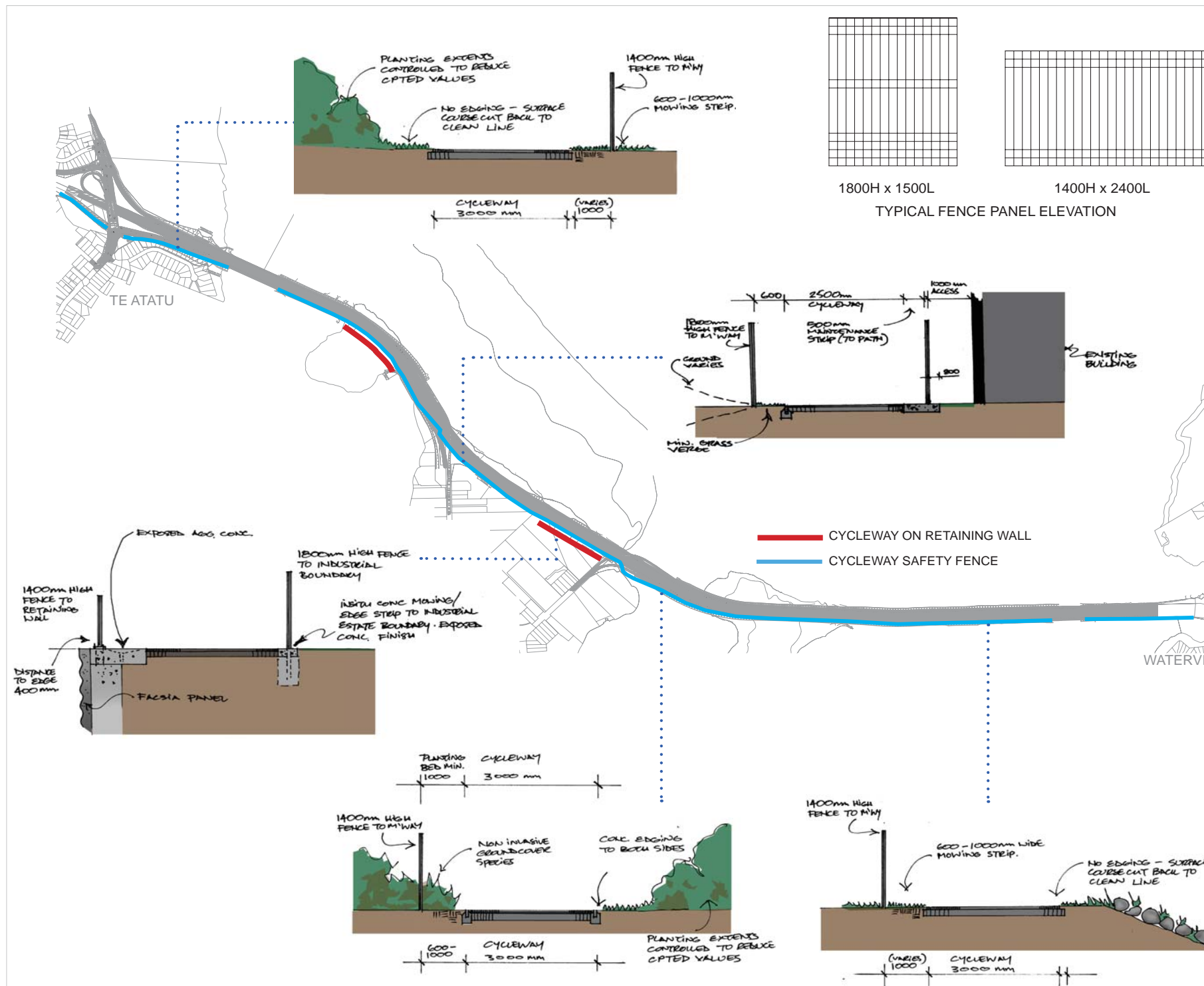


Figure B-27: Proposed fencing arrangements – SH16

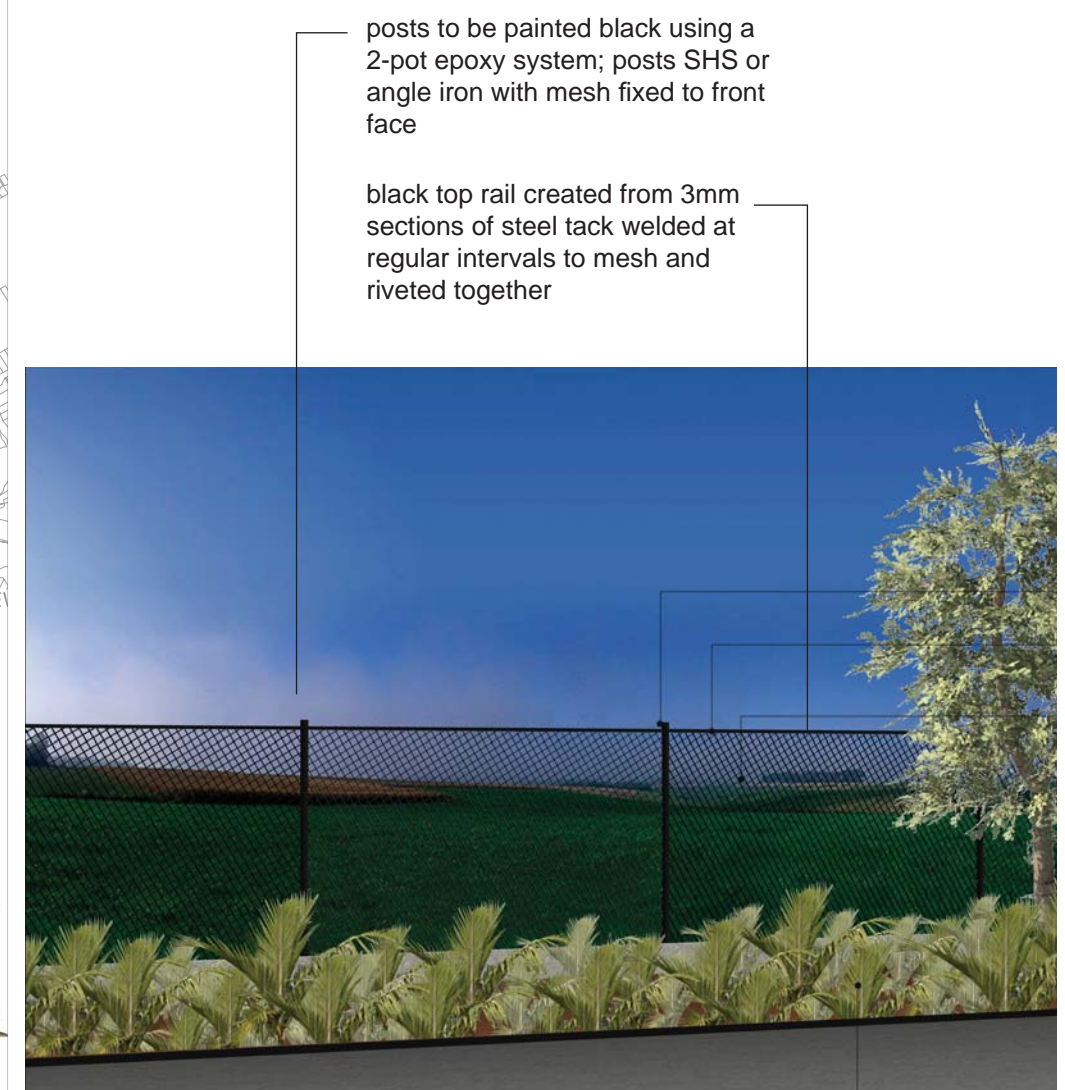


Figure B-28: Proposed fence concept – SH20