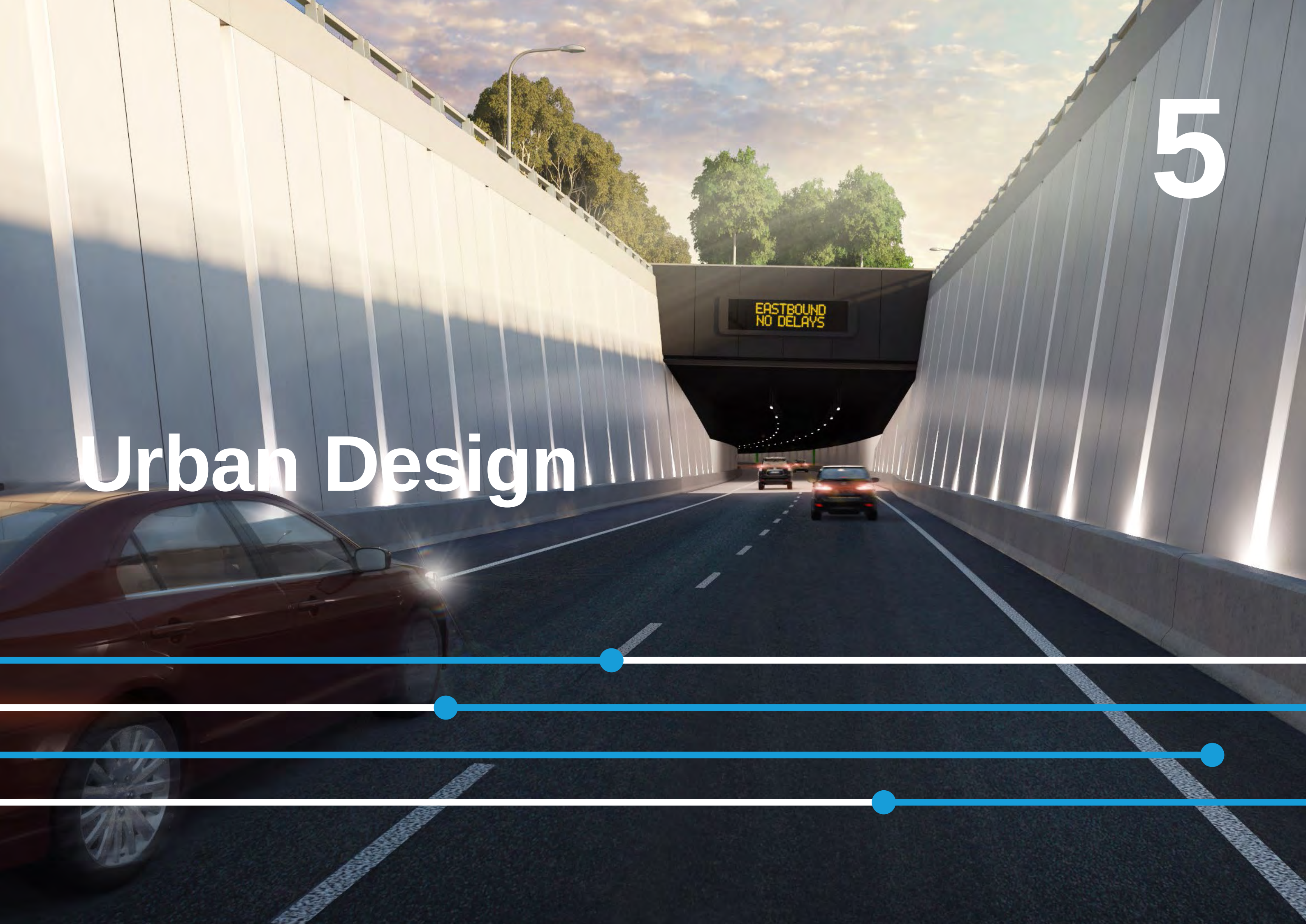


5

Urban Design



Urban Design

The urban and landscape design of the project is concentrated on the following geographical areas:

- Western surface works
- Bexley Road
- Arncliffe
- St Peters interchange and local road upgrades

Within these areas the design of built form and landscape aims to minimise intrusion on existing environments, whilst providing benefits such as improved active transport infrastructure and creation of open space. An identity is created through development of considered and integrated design solutions.

In addition to the surface interventions, the urban design of the motorway tunnels has been considered in the context of the journey experience. An overarching art and lighting strategy (section 7) marries the surface works and tunnel experience.

The following sections detail the urban design inclusions throughout the corridor.

5.1 Materials, colours and surface finishes

A draft material palette has been developed that would be utilised for most of the built-form structures throughout the corridor. The materials selection has been carefully curated for appearance, durability and maintainability. Primarily the materials and finishes have been selected to visually unify the buildings across the project whilst remaining contextually relevant. These materials are subject to further refinement during the detailed design phase.

Two typologies define the specific choice of building materials and detailing - the first comprising the occupied buildings (Maintenance facility and the Motorway Control Centre); the second comprising buildings and facilities that support the operation of the tunnels and portals. The former are buildings used and inhabited by people on a daily basis. They provide spaces and volumes that are appropriate to human scale, contain materials that have a tactile quality, and create environments that are both comfortable and sustainable for their occupants. The latter are simple structures that are designed to integrate into their adjacent environments. Figure 15 details the draft materials that could be utilised throughout the corridor, and the following sections outline how the composition of these materials would achieve the urban design principles outlined for New M5.

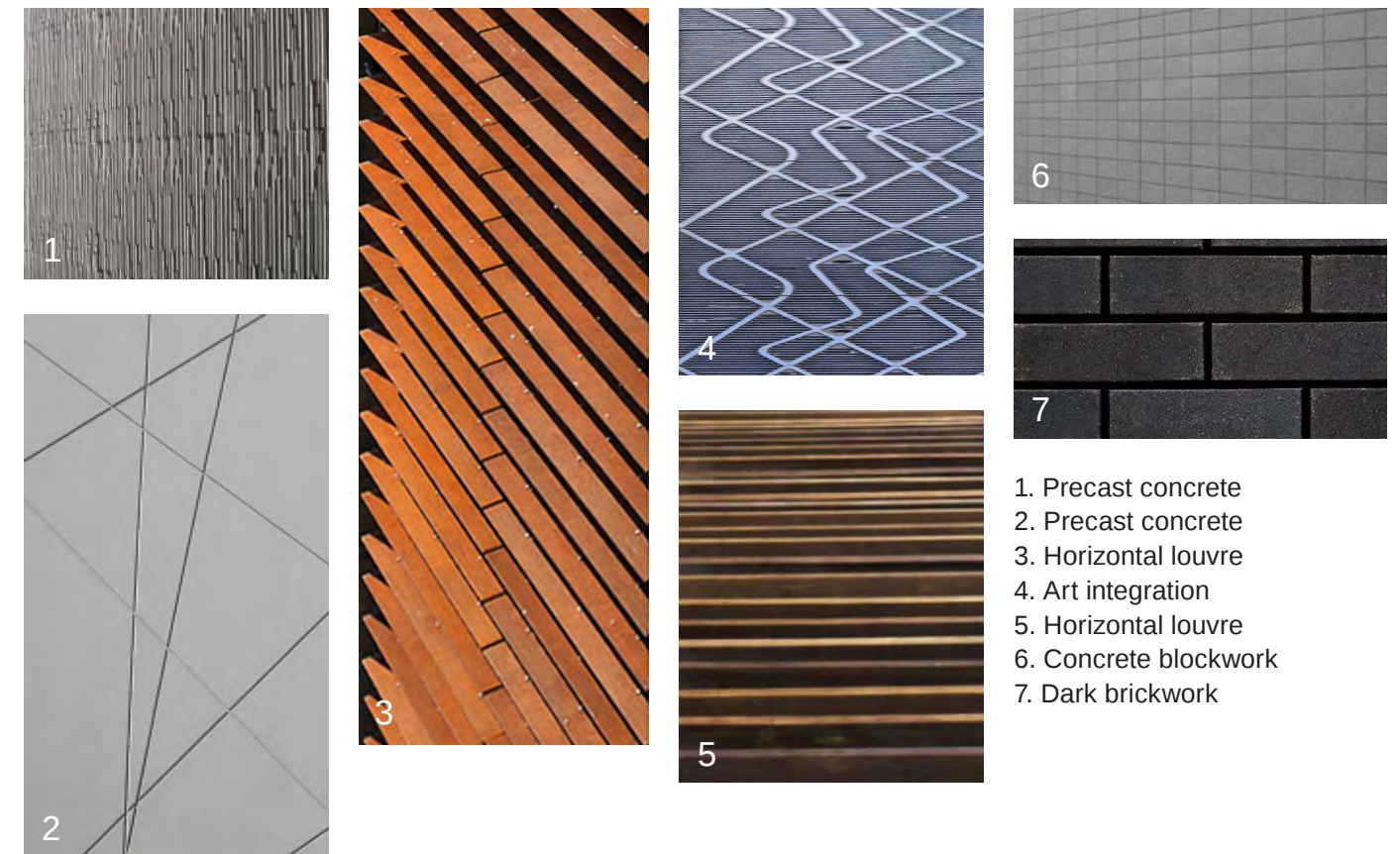


Figure 13 Draft material palette

5.2 Ventilation facility design

Apart from the motorway itself, the ventilation facilities for New M5 would become one of the most visible aspects of the project. The architectural design of ventilation facilities within the New M5 must account for a number of functional requirements. To ensure the efficient and effective functioning of the ventilation facilities, aspects of the architectural design such as height, separation distances between exhaust fans and location must be informed by the functional requirements. This dictates a minimum standard for the scale and arrangement of form for the facilities.

There are many examples of ventilation facility design both within Australia and internationally. Each example is individual, accounting for a unique set of operational requirements. In the case of the New M5 a significant consideration is the proximity to Sydney Airport and constraints around velocities of exhausted air.

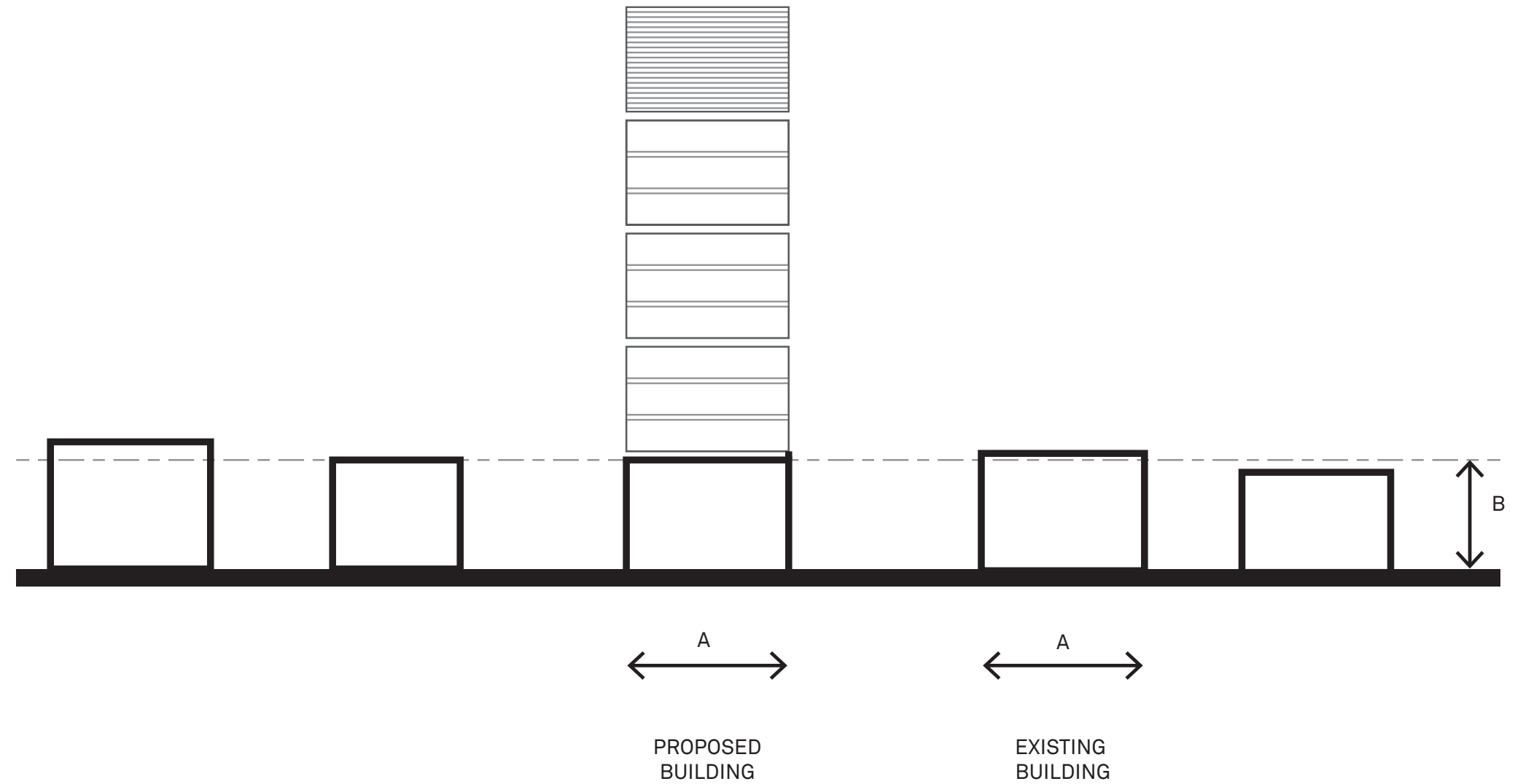
The ghosted white building envelopes depicted for each of the new M5 ventilation facility sites demonstrate the most conservative approach to the above criteria. A detailed review will be undertaken to test the existing proven scheme to identify further efficiencies, which will result in the best architectural and urban design outcome.

During the detailed design phase this detailed review would be undertaken. The following design principles would be utilised to guide the architectural treatment of the ventilation facilities:

5.2.1 Reflective of site and context

The ventilation facilities for the New M5 must respond to their local site and context, through:

- macro scale- the arrangement of forms and orientation of the built elements on site,
- micro scale- cladding panel sizes and arrangements, material selection, and façade patterning.
- integration of interpretative heritage and public art to strengthen the relationship of the New M5 facilities to their individual locations.

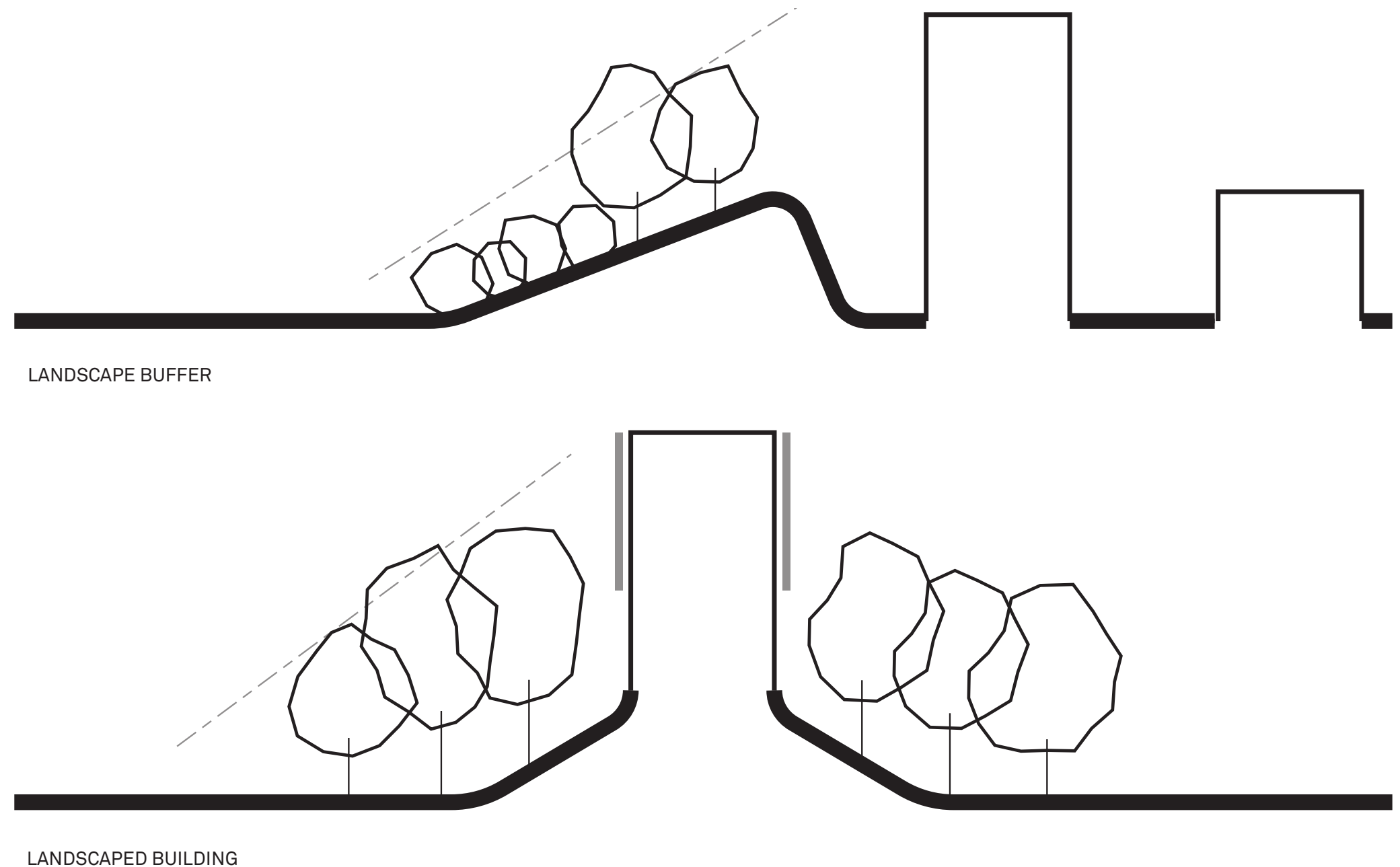


5.2.2 Integration with landscape

Planted and sculptured landscaped buffers can assist in softening the boundary between the new built structures and existing adjacent neighbours and precincts. This screening is particularly important at the ground plane where there are additional horizontal buildings.

Landscape treatment can be used to integrate ventilation facilities through:

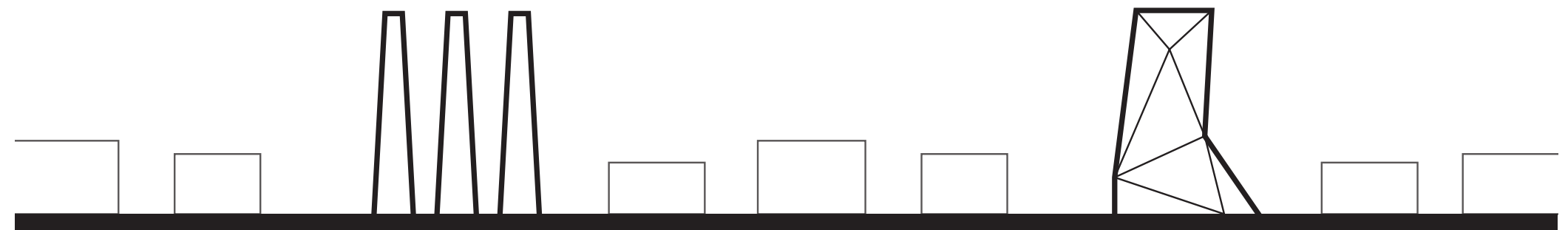
- Species selection reflective of the surrounding environment
- Continuation of surrounding planting patterns
- Providing visual interest and softening along lower levels of the built form



5.2.3 Sculptural urban scale objects - urban landmarks

The functional requirements dictate the overall height of the ventilation facilities, meaning they will command a prominent place in the skyline. The integration of design principles addressing materiality and the response to site and context will contribute to the structure becoming urban landmarks. However scale and form will also be key in the appreciation and identification of the ventilations facilities from a distance, and at different times.

The facilities could be recognisable in silhouette against the skyline at dusk as readily as they are understood during the day, and lighting can be integrated to display the sculptural forms at night.

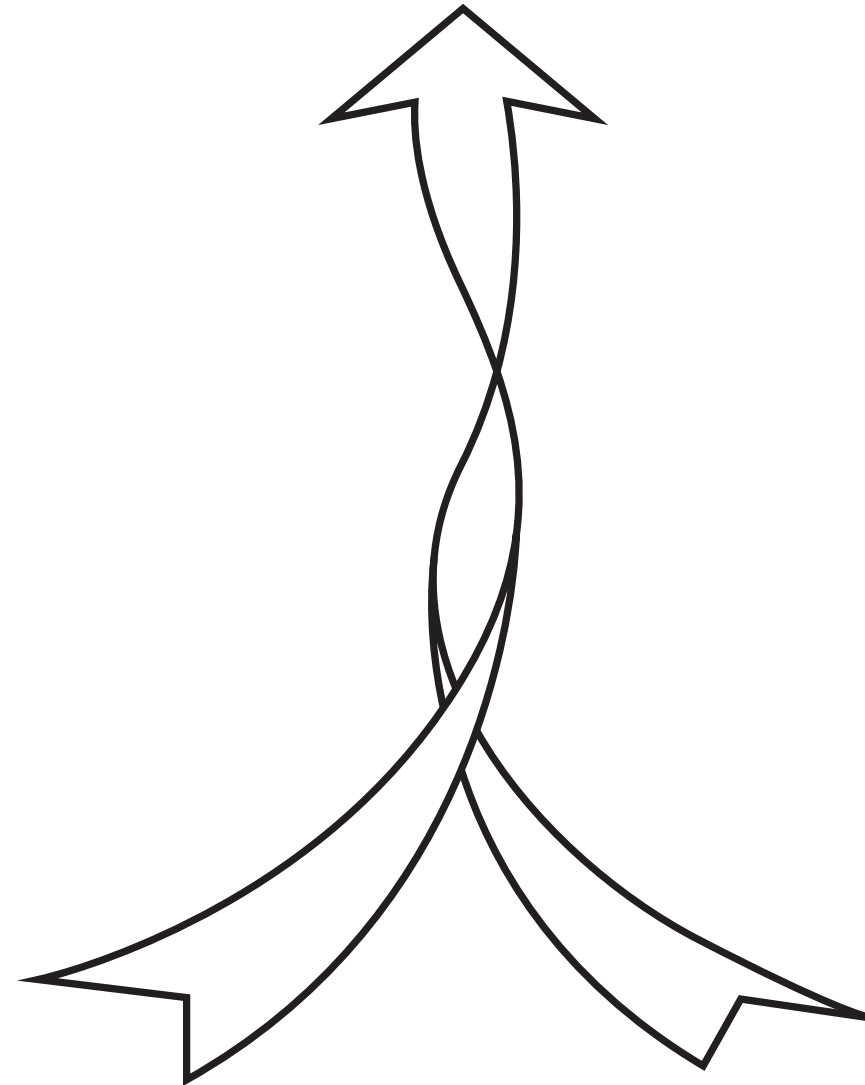


ELEMENTAL FORM

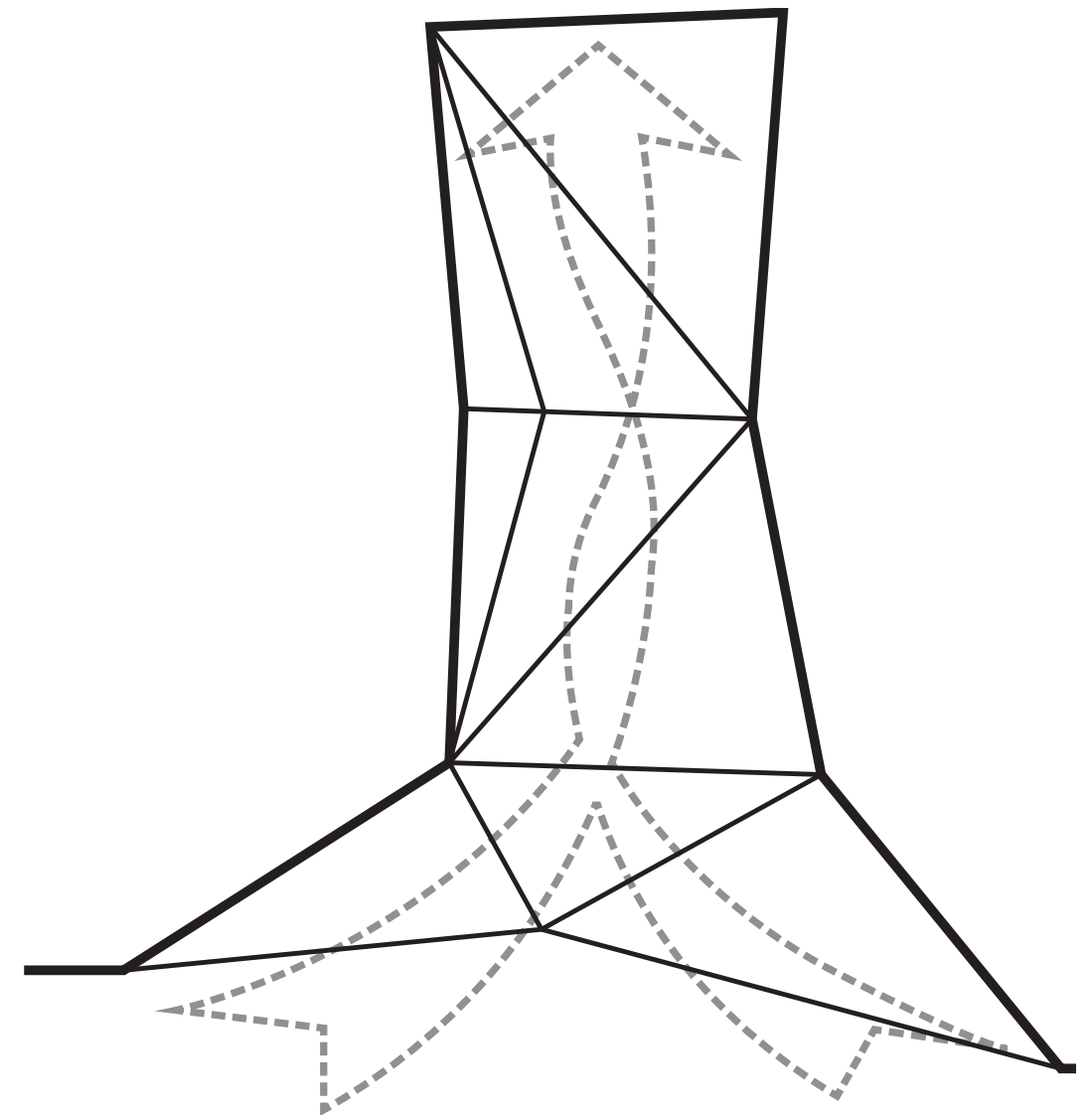
CONSOLIDATED/SCULPTURAL FORM

5.2.4 Forms informed by function

The form of the building must be reflective of its functionality. The representation of the inner functional requirements and the architectural expression will add authenticity to the collection of built elements and provide a unifying rationale for the development of the design.



AIR FLOW



SCULPTURAL FORM

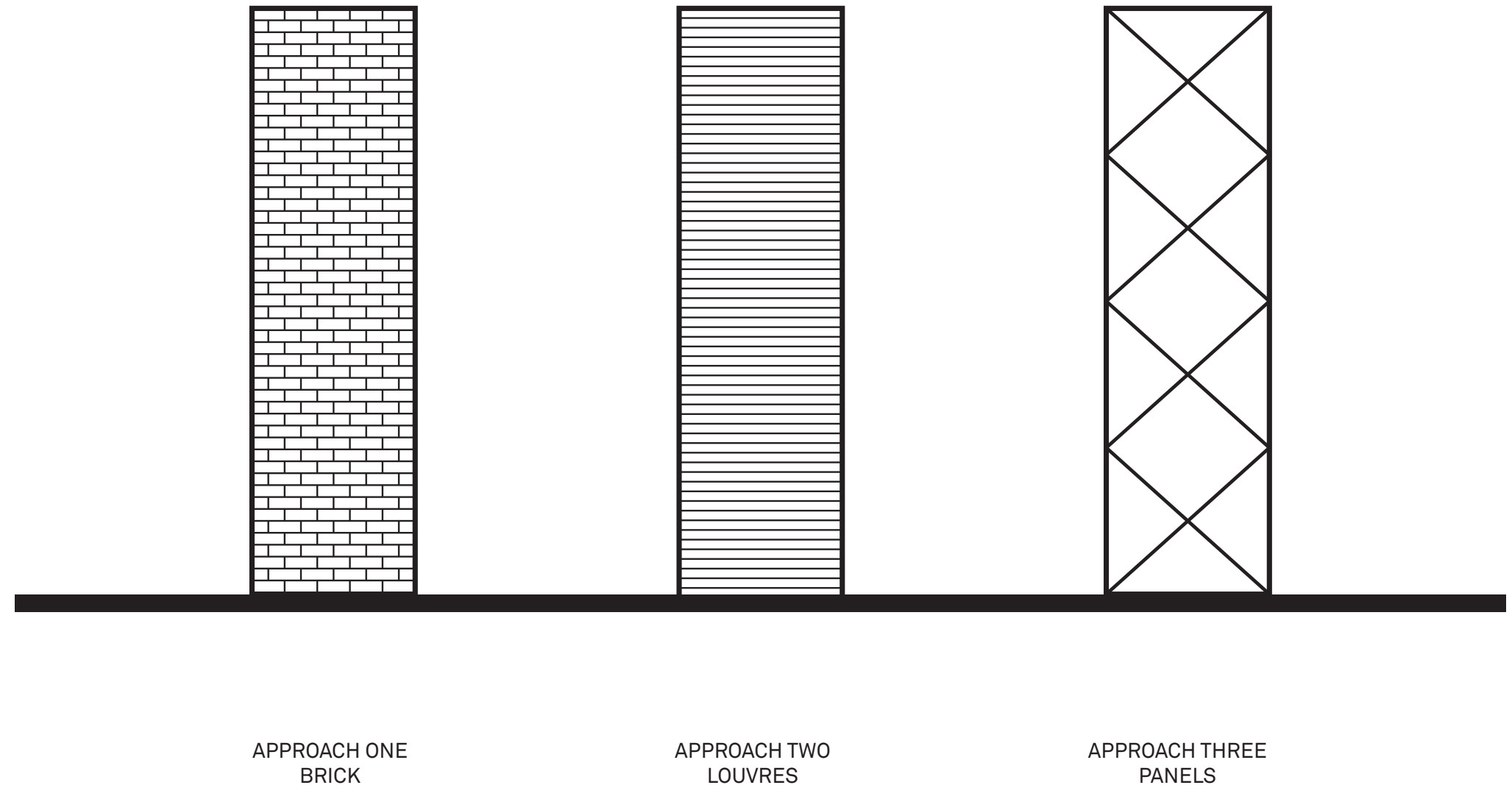
5.2.5 Identifiable by their materiality

To strengthen the response to site and context, and to assist the creation of sculptural urban scale landmarks, materials selection will be used to create an identity at each location. Inspiration will be drawn from existing historical precedents such as those at the St Peters brick pit, and applied in a contemporary way to the ventilation facilities.

5.2.6 Appropriate use of materials

From both an economic and sustainable vantage point, materials will be selected and used in a responsible and judicious manner. The appropriate use of materials will lend integrity to the collection of built elements and create a lasting high quality legacy.

In addition to the design principles, feedback gained during the EIS exhibition process will be considered to inform the final architectural treatment and further refine the concept design.



5.3 Western surface works

The western connection of the New M5 occurs between King Georges Road and Bexley Road within the existing M5 East Motorway corridor adjacent to Canterbury Golf Course and Beverly Grove Park. Located in Kingsgrove, the western surface works Motorway Operations Complex 1 (MOC1) includes:

- Widening of the M5 East Motorway
- An east-bound tunnel entry portal
- A west-bound tunnel exit portal
- The Kingsgrove motorway operations complex, comprising of a:
 - Maintenance facility
 - Ventilation facility
 - Distribution substation
 - Deluge tanks

The motorway operations complex is located on the southern side of a realigned westbound bypass ramp adjacent Wollie Creek. The site is currently part of the M5 Linear Park and consists of an open turfed area with a shared path and is adjacent to existing industrial businesses.

Within the western surface works, the portals have been designed to fit within the widened M5 East Motorway corridor, connect with the King Georges Road interchange (KGRI) and present as a new, sleek and refined element within a crowded infrastructure environment.

The following sections provide further detail on the preliminary design of each of the above mentioned facilities. Details regarding the landscape treatment and amendments and upgrades to surrounding active transport connections are detailed in section 6.



Figure 14 Western Surface Works Facilities



Figure 15 Artist's impression of Western Surface Works

5.3.1 Maintenance facility

The Kingsgrove motorway operations complex (MOC1) would include a maintenance facility to support maintenance of the project during operation for a workforce of up to 10 workers.

The maintenance facility would include a workshop, storage for spare parts and equipment, parking for up to 15 vehicles, a second storage area for bulky equipment and spare parts and an office building including kitchen facilities and amenities.

Design Intent

Two structures comprise the maintenance facility at Kingsgrove – a workshop with staff offices to the east, and a large covered store to the west. The overall design intent is to blend the structures seamlessly with the surrounding warehouse buildings. Together with the landscaping proposed for this site, the facility would appear as another industrial building.

A combined access road and shared path from Tallawalla Street is located to the south-west of the complex, with access to the secure maintenance area between the two built structures, and staff and visitor parking to the east of the workshop and office building.

Materials, colours and finishes

The workshop is constructed of precast concrete panelling to the dado with zincalume profiled cladding above that wraps over the roof. These materials denote the industrial nature of the building and blend well with the surrounding warehouse structures. On the eastern face of the workshop the staff offices are denoted through full length curtain wall glazing between horizontal concrete bands. These bands as well as the northern and southern facades are further embellished with perforated corten cladding. The distinction in materials together with a reduction in roof height for the staff offices denotes its use for human-scaled activities as opposed to the more industrial nature of the workshop. Furthermore this

composition begins the language for the New M5 that would be continued along the corridor, east to St Peters.

Sitting slightly lower than the westbound bypass lane, the covered store to the west of the workshop facility features a zincalume clad roof and concrete blockwork walls. The roof would be visible to passing motorists and is in keeping with the large span metal roofs of surrounding warehouses. The concrete blockwork is largely hidden from view.

The following pages provide site plans, elevations and perspectives for the preliminary design of the western surface works facilities. These plans would be further developed during detailed design.

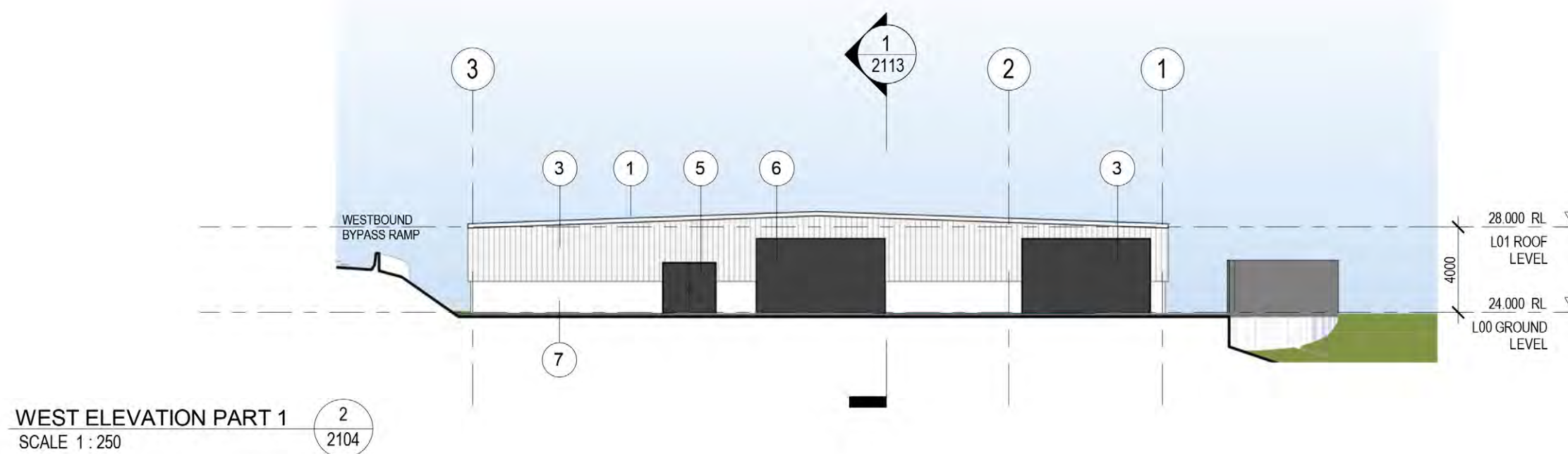
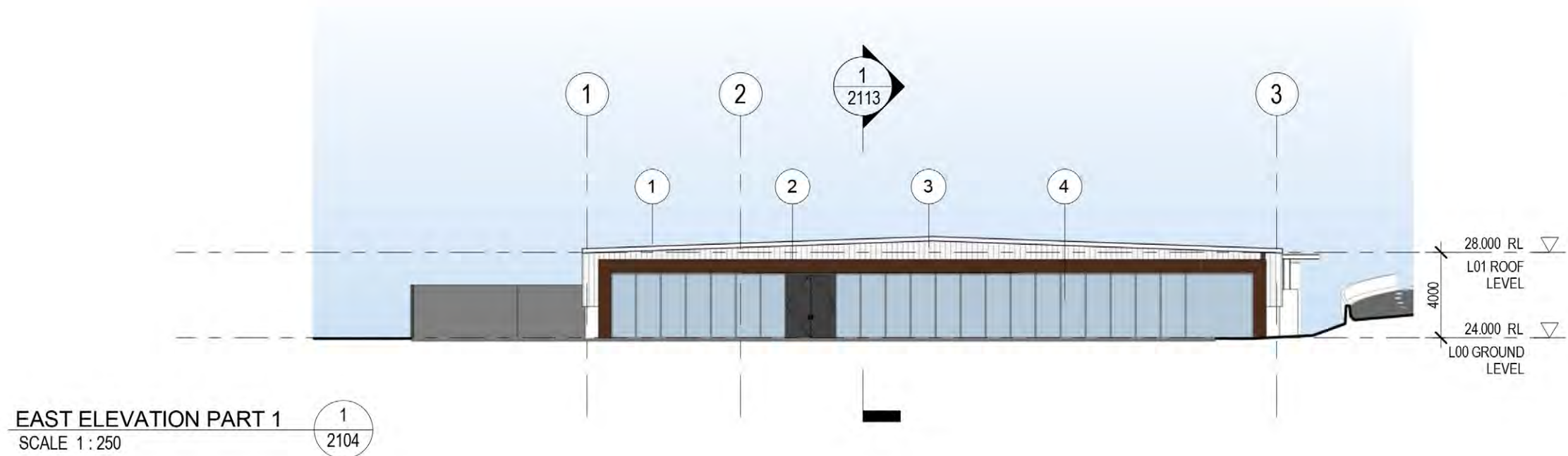


Figure 16 Indicative maintenance facility at Kingsgrove elevations

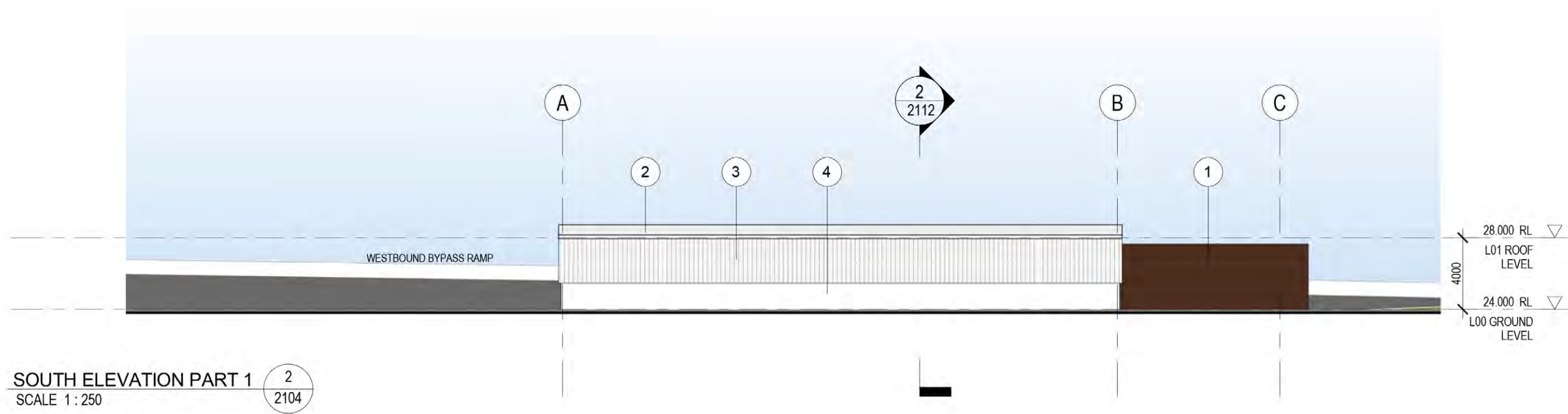
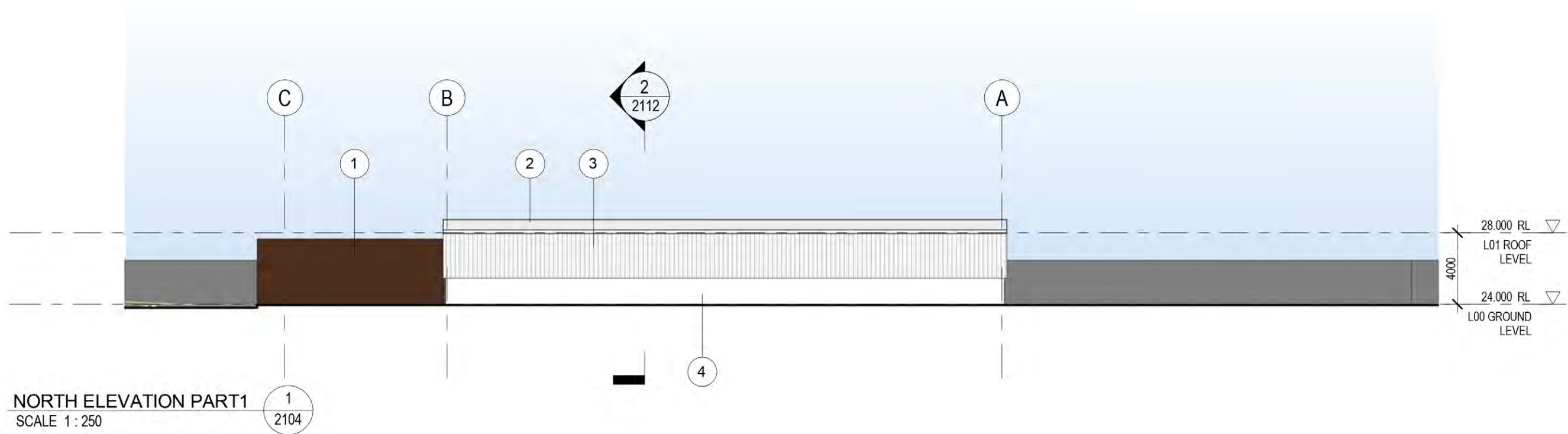


Figure 17 Indicative maintenance facility at Kingsgrove elevations

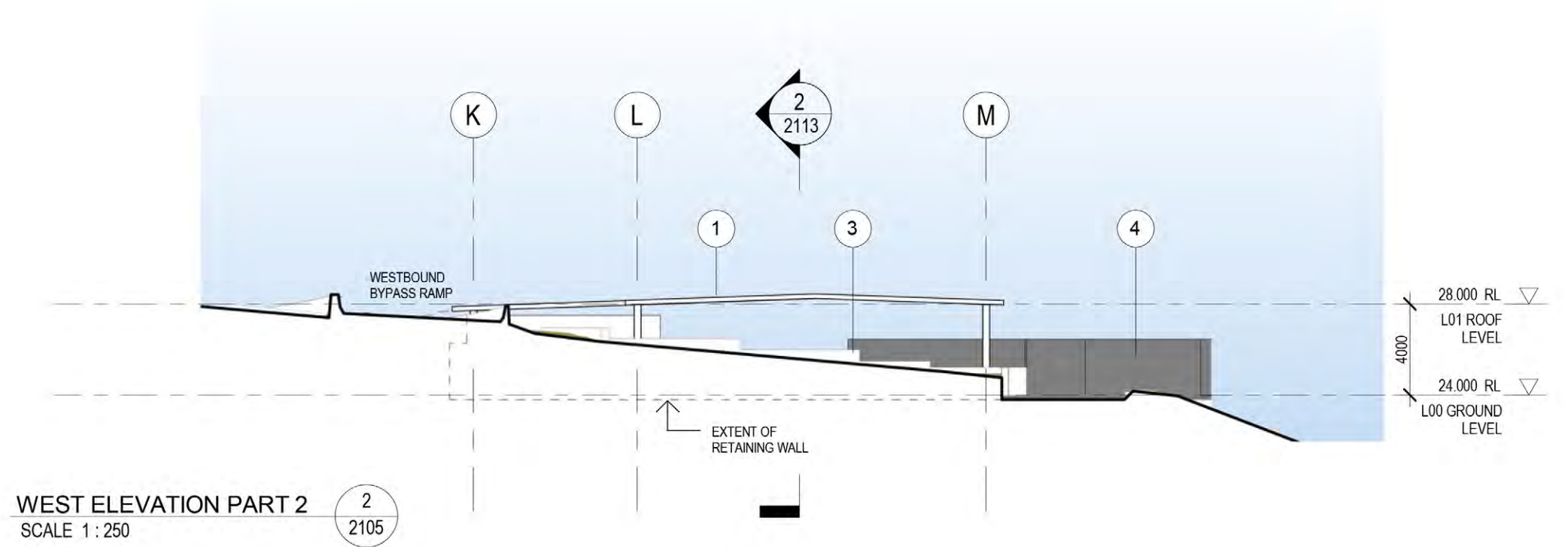
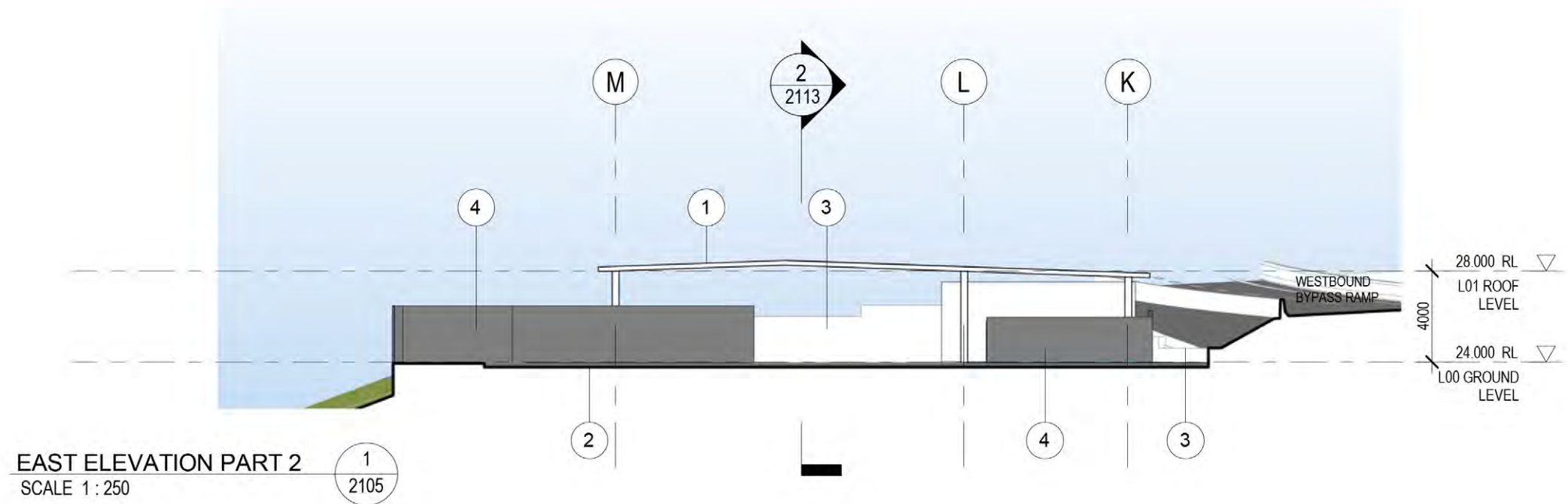
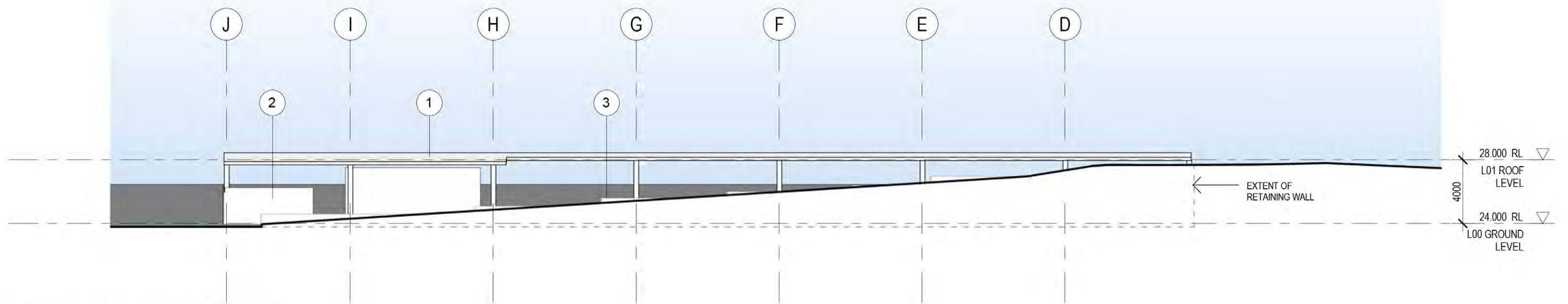
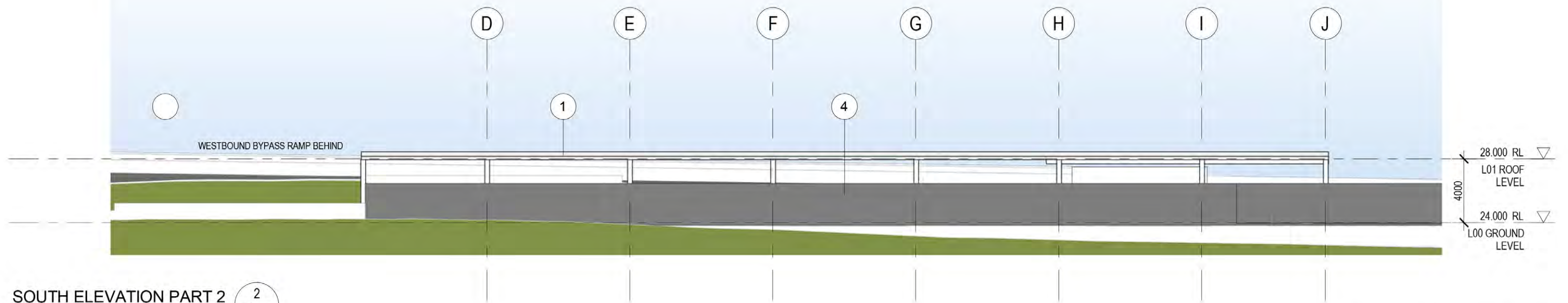


Figure 18 Indicative maintenance facility at Kingsgrove elevations



NORTH ELEVATION PART 2
SCALE 1 : 250

1
2104



SOUTH ELEVATION PART 2
SCALE 1 : 250

2
2105

Figure 19 Indicative maintenance facility at Kingsgrove elevations



Figure 20 Indicative maintenance facility at Kingsgrove perspective A



Figure 21 Indicative maintenance facility at Kingsgrove perspective B

5.3.2 Ventilation facility, deluge tanks and distribution substation

A ventilation facility, deluge tanks and distribution substation are also part of the MOC1 operations complex. The deluge tanks store water for use in the event of an emergency within the tunnels. Power for tunnel services is provided by the distribution substation.

Design intent

The ventilation facility, deluge tanks and distribution substation are located to the north of the maintenance facility. The location of the ventilation facility above the west bound exit ramp provides the most practical location to serve this function from an operational and ventilation perspective.

A fire pump room and water deluge tanks are located adjacent to the motorway, with the distribution substation behind. These buildings are largely screened from view due to the noise wall to the north and the landscaping to the south.

Materials, colours and finishes

The horizontal portion of the substation building is clad in dark face brick – a contemporary interpretation of the ‘red brick’ nature of surrounding suburbs. Openings providing service access to the plant rooms are grouped in common recesses, exposing the structure – a smooth-faced concrete block (stack bond pattern). Access doors within the block work are painted a light grey to match.

The ventilation facility will be further developed in accordance with the methodology outlined in section 5.2.

The following pages contain preliminary site plans, elevations and perspectives of the MOC1 facilities. These plans would be further developed during detailed design.

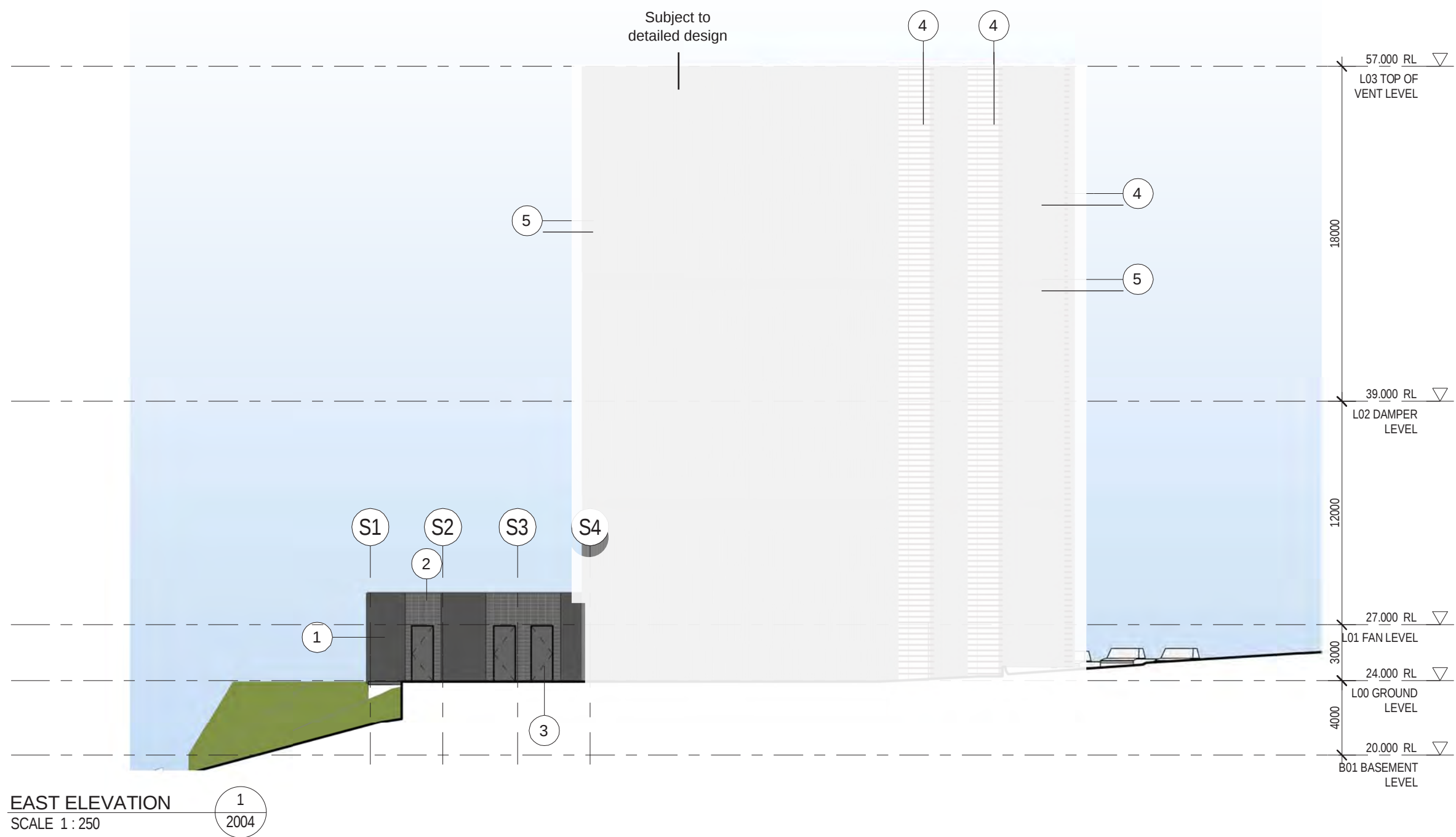


Figure 22 MOC1 facility at Kingsgrove indicative elevations

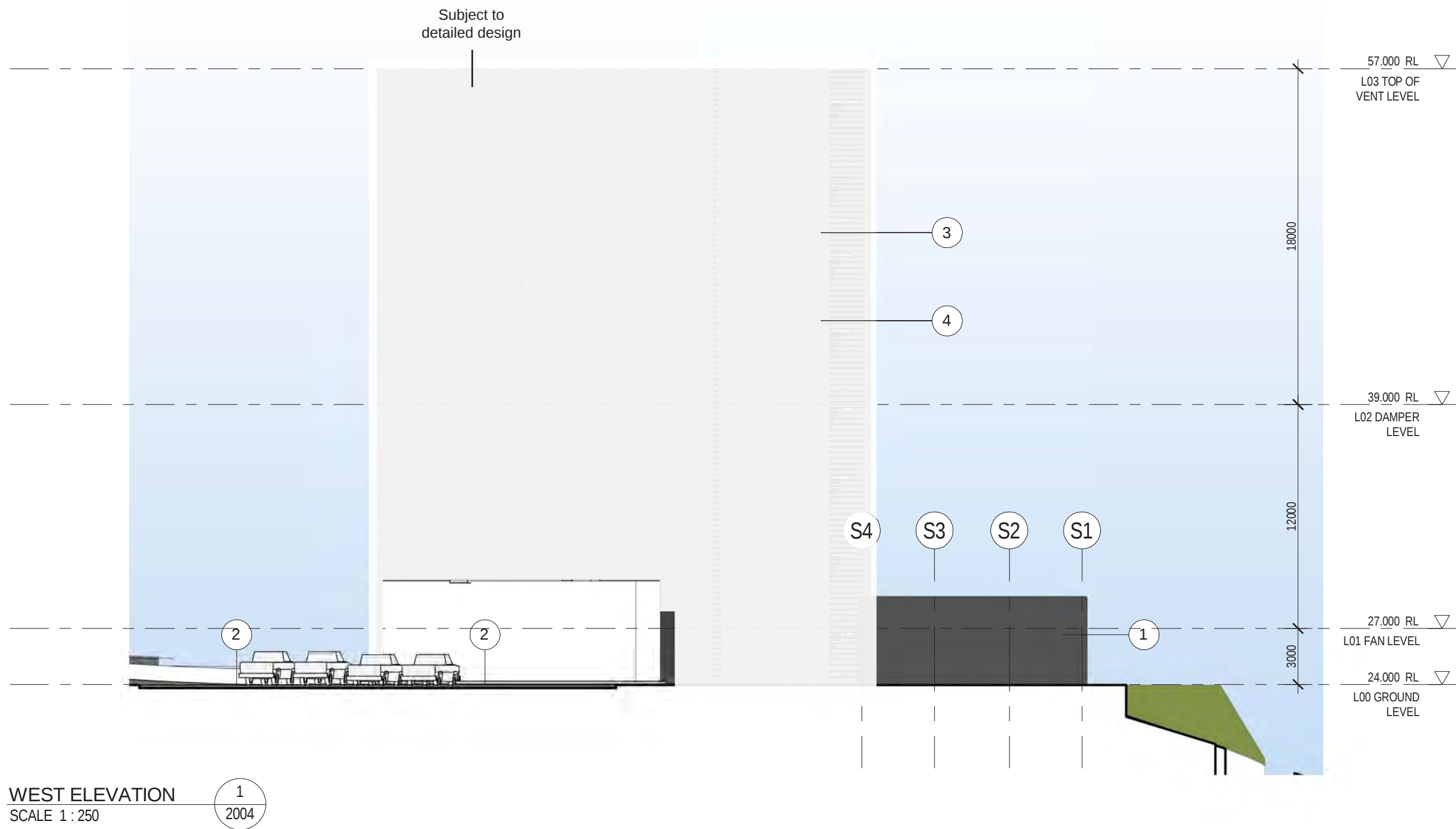
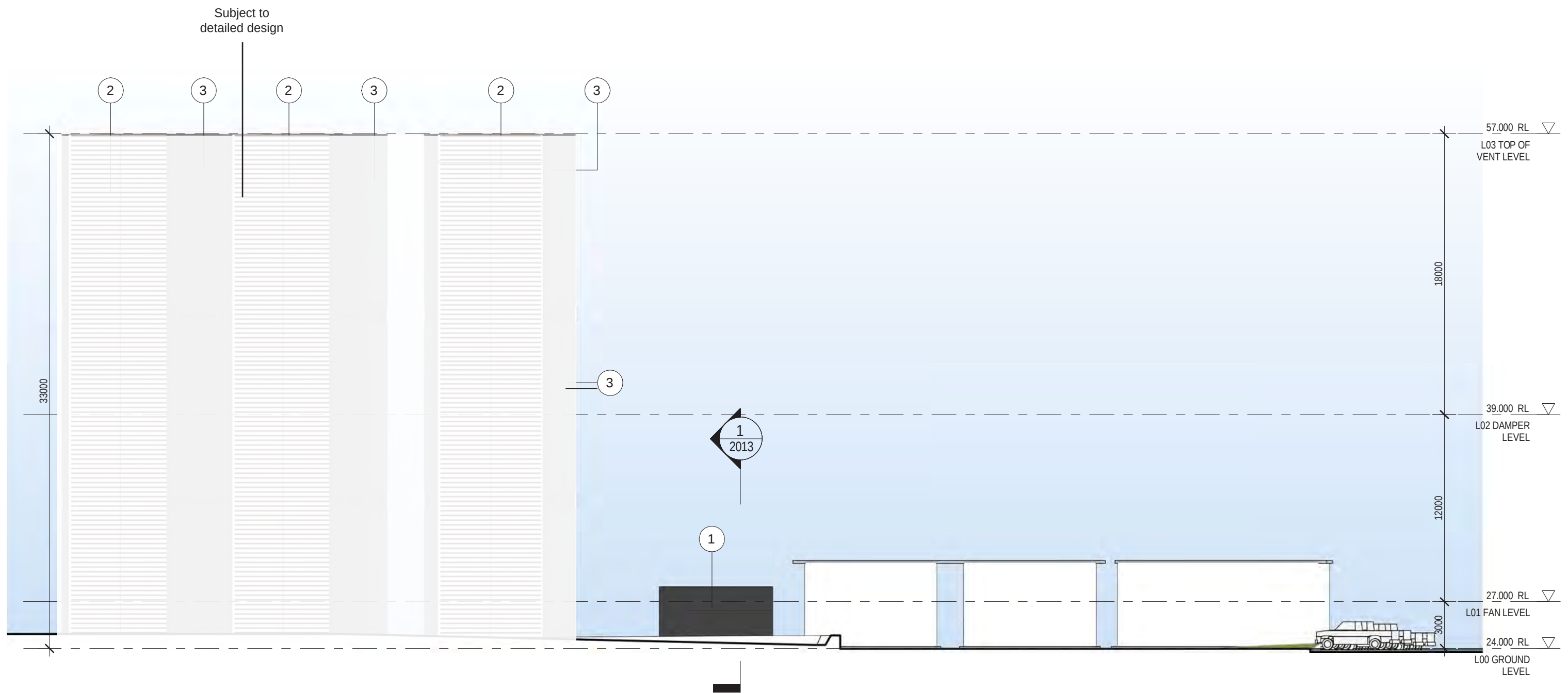


Figure 23 MOC1 facility at Kingsgrove indicative elevations



NORTH ELEVATION
SCALE 1 : 250

1
2004

Figure 24 MOC 1 facility at Kingsgrove indicative elevations

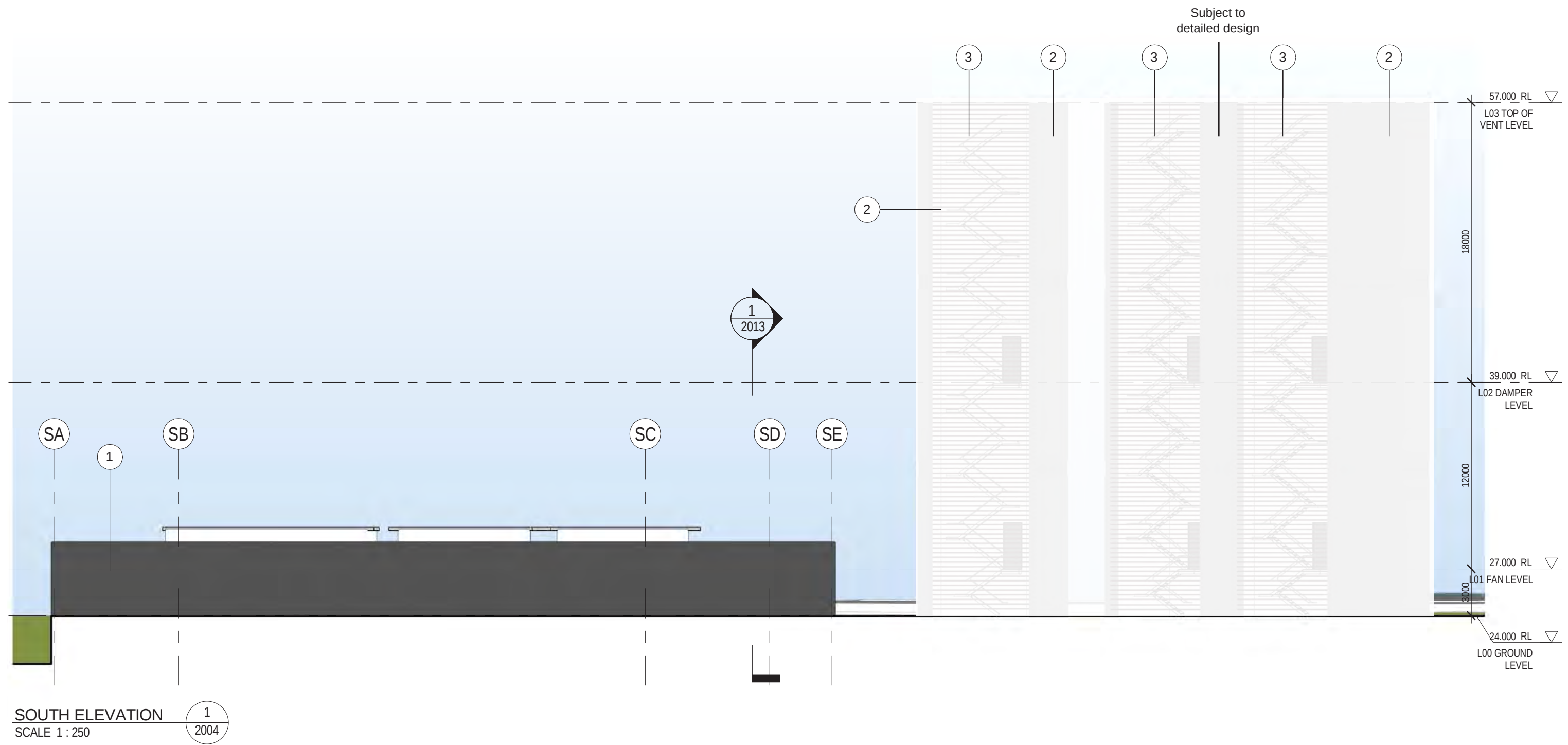


Figure 25 MOC1 facility at Kingsgrove indicative elevations



Figure 26 MOC1 facility at Kingsgrove indicative visualisation



Figure 27 MOC1 facility at Kingsgrove indicative perspective A



Figure 28 MOC1 facility at Kingsgrove indicative perspective B



Figure 29 Western portal indicative visualisation

Design Intent

5.3.3 Portals

The western portals provide eastbound ingress to New M5 and westbound egress from New M5 to the M5 East Motorway. The portals are located within an expansive infrastructure corridor spanning 10 lanes of traffic. To ameliorate the expanse of road space, a series of 'green canopies' would assist in blending the proposed infrastructure elements within the local built and natural fabric.

The urban design outcomes at this location are guided by a number of variable motorway infrastructure elements including the M5 East Motorway, the M5 Southwest, and the King Georges Road Interchange Upgrade. All of this combines to create a variable and cluttered driver experience.

The overall design intent for tunnel portals is to create a refined design aesthetic that avoids clutter. Portals have been designed as architectural elements that are attractive and welcoming.

The portals have been designed to fit within the existing M5 East corridor, connect with the KGRIU and present as a new, sleek and refined element within a crowded infrastructure environment.

Material, colours and finishes

Tunnel portals have been designed using robust, durable materials with the integration of lighting and signage. Tunnel portals feature the following:

- Portal walls would have a select paint finish with anti-graffiti coating
- Portal facades would be a black composite metal cladding (Alpolic) on structural steel frame
- Tunnel entry portals would feature black variable message signs above tunnel entry ramps, blending seamlessly with the black composite metal cladding portal facades
- Tunnel dive approach structures which feature wall cladding with a composite metal cladding (Alpolic) coloured 'silver grey' with feature lighting rebates staggered at regular centres with LED strip lighting.

The following pages include preliminary sections that demonstrate the design intent and composition of materials for the portals. These plans would be further developed during detailed design.



01 SECTION ELEVATION - TUNNEL PORTAL ENTRY
1:100

Figure 30 Indicative western portal northbound entry

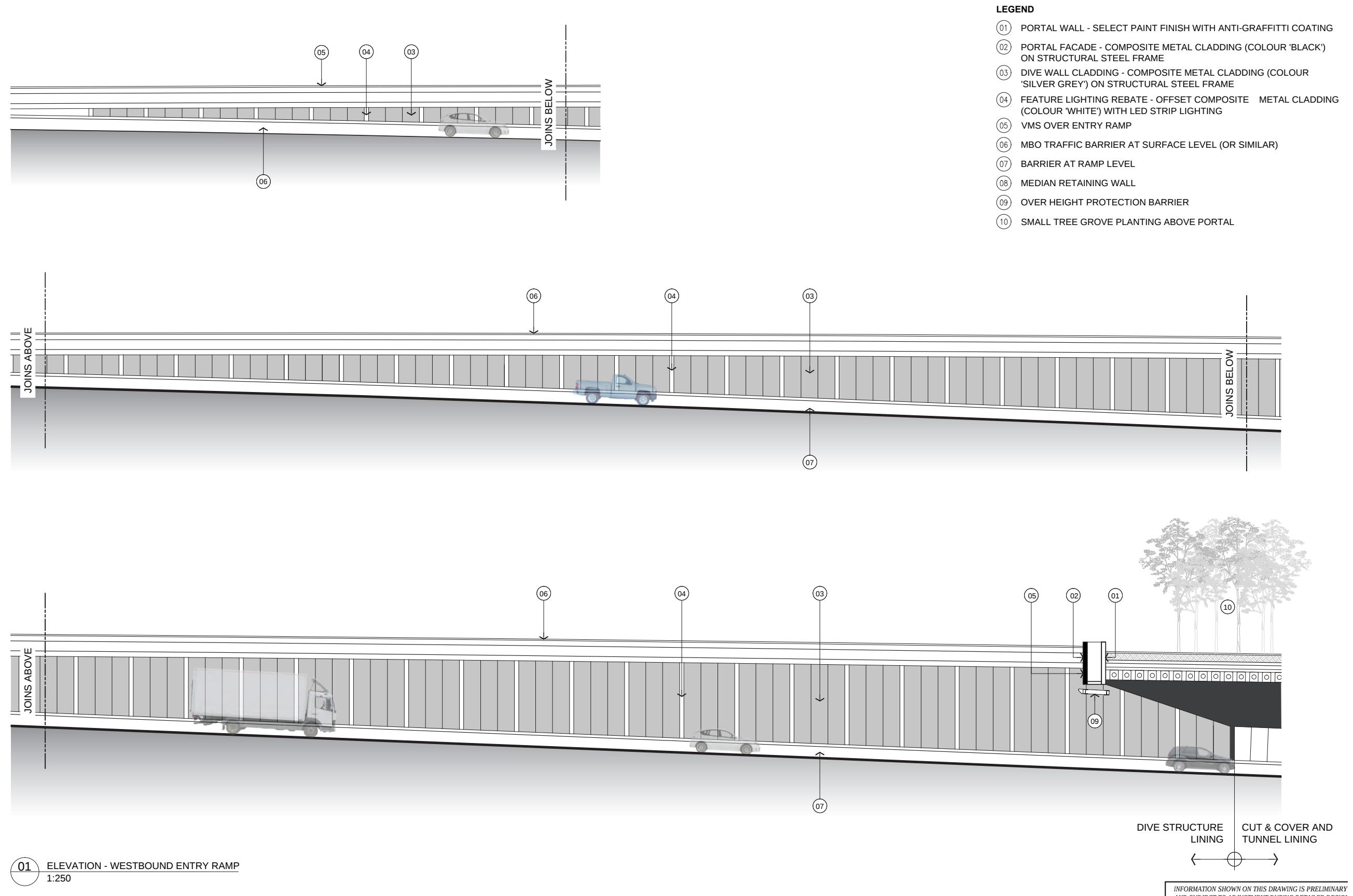


Figure 31 Indicative western portal dive structures

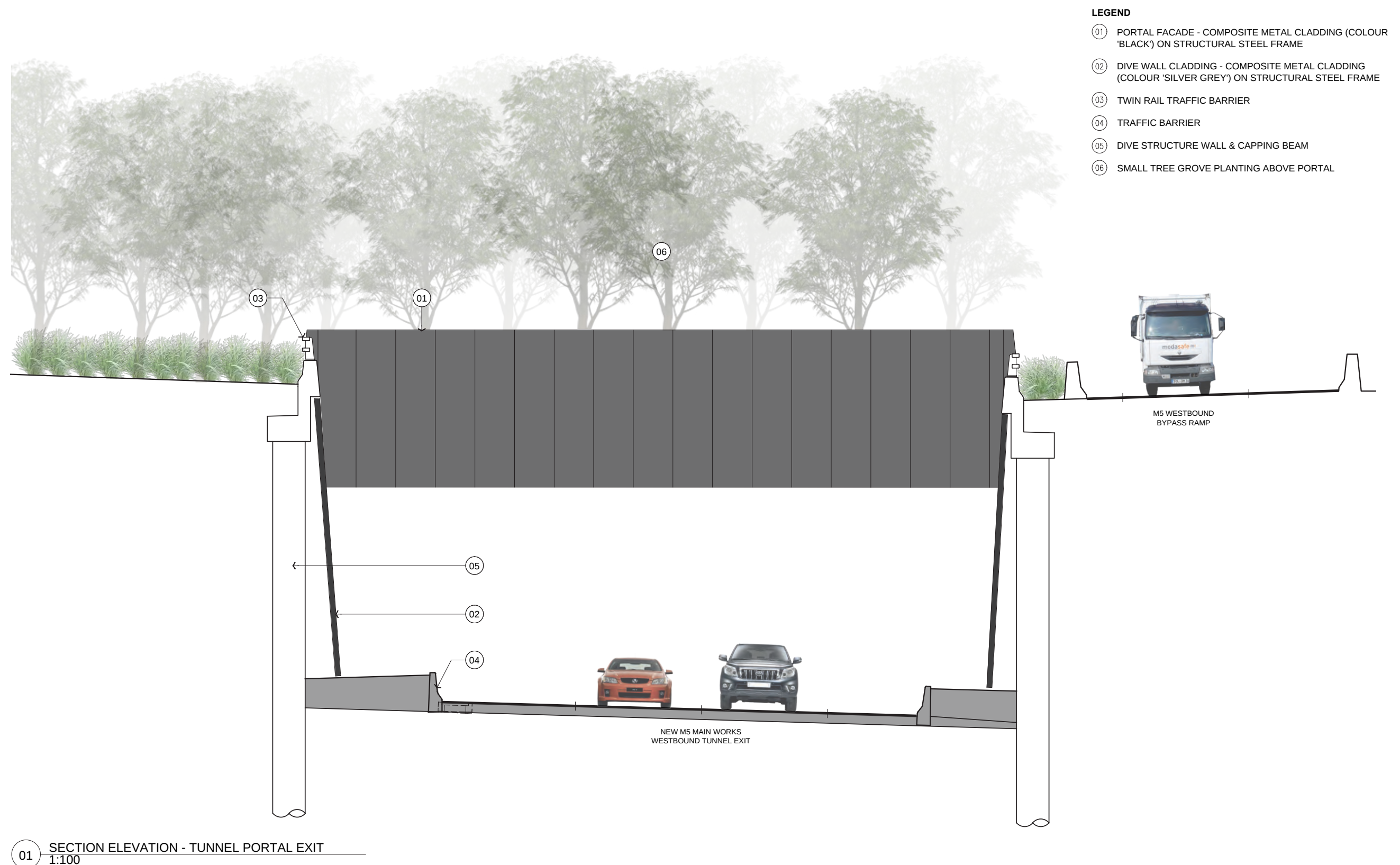
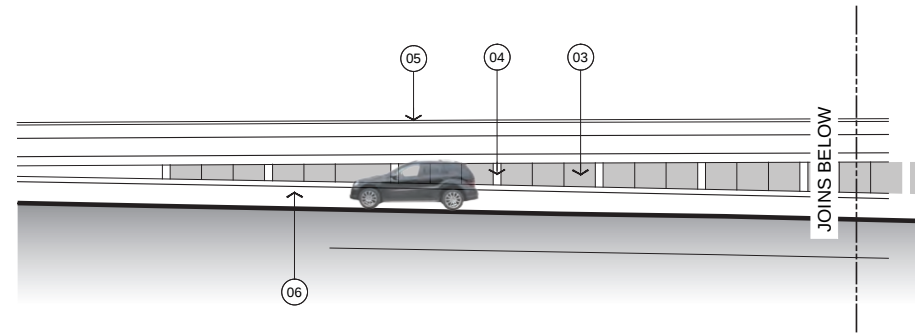
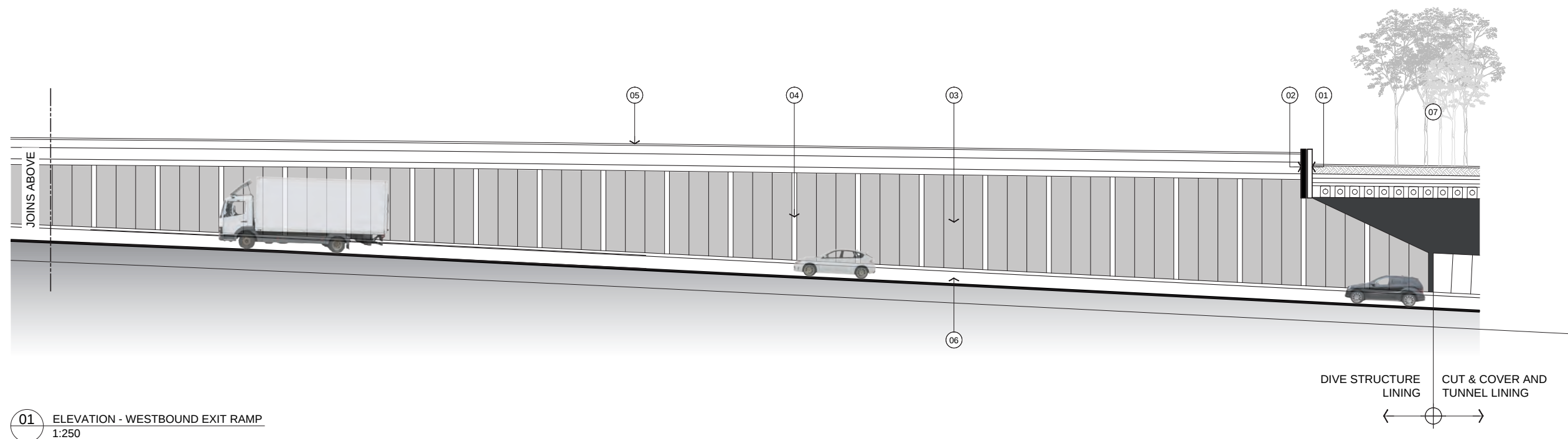
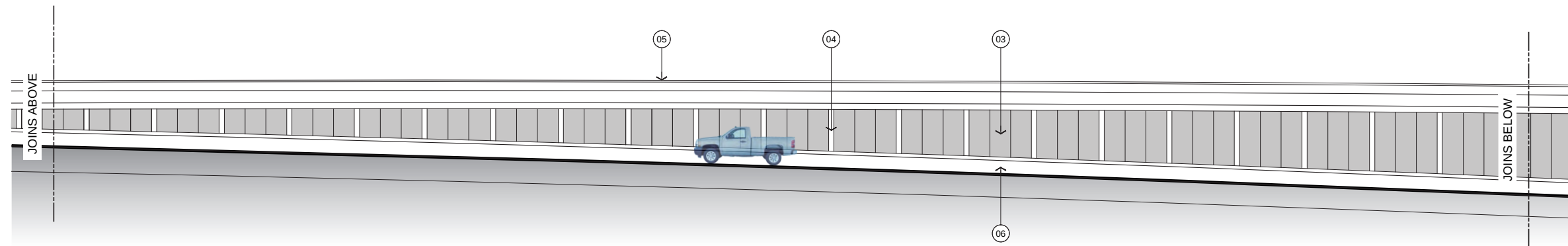


Figure 32 Indicative western portal southbound exit



LEGEND

- 01 PORTAL WALL - SELECT PAINT FINISH WITH ANTI-GRAFFITI COATING
- 02 PORTAL FACADE - COMPOSITE METAL CLADDING (COLOUR 'BLACK') ON STRUCTURAL STEEL FRAME
- 03 DIVE WALL CLADDING - COMPOSITE METAL CLADDING (COLOUR 'SILVER GREY') ON STRUCTURAL STEEL FRAME
- 04 FEATURE LIGHTING REBATE - OFFSET COMPOSITE METAL CLADDING (COLOUR 'WHITE') WITH LED STRIP LIGHTING
- 05 MBO TRAFFIC BARRIER AT SURFACE LEVEL (OR SIMILAR)
- 06 BARRIER AT RAMP LEVEL
- 07 SMALL TREE GROVE PLANTING ABOVE PORTAL



01 ELEVATION - WESTBOUND EXIT RAMP
1:250

Figure 33 Indicative Western Surface Works urban and landscape design portal approaches exit ramp elevation

5.4 Bexley surface works

A small air intake, emergency smoke extraction facility and distribution substation is located south of the existing M5 East interchange at Bexley Road. This Motorway Operations Complex 2 (MOC2) would supply fresh air to the tunnel and in emergencies be utilised for smoke extraction.

Design intent

The emergency smoke extraction facility is located within the centre of an existing turfed road reservation adjacent Bexley Road, with vertical fans located below ground. A distribution substation is located to the east of the facility. Vehicle access is provided from Bexley Road (left turn in, left turn out). The design intent is understated whilst being recognisable as part of the overall New M5 family.

Materials, colours and finishes

The distribution substation would be clad in dark face brick. As in Kingsgrove, this material forms a contemporary interpretation of the surrounding red brick residences. In this context it begins to blend more seamlessly as many of the surrounding residences have had contemporary alterations and additions or are newly constructed. Glazing to the northern and western façade of the distribution substation together with its relatively low scale make it appear residential in nature, aiding its ability to blend with the surrounds. The emergency smoke extraction facility is constructed of precast concrete panel walls in recognition of its utilitarian nature. This is a similar approach to the M5 East trial ventilation facility on the eastern side of Bexley Road where the building is clad in rendered blockwork above sandstone footings with the more utilitarian buildings behind constructed of raw concrete block work.

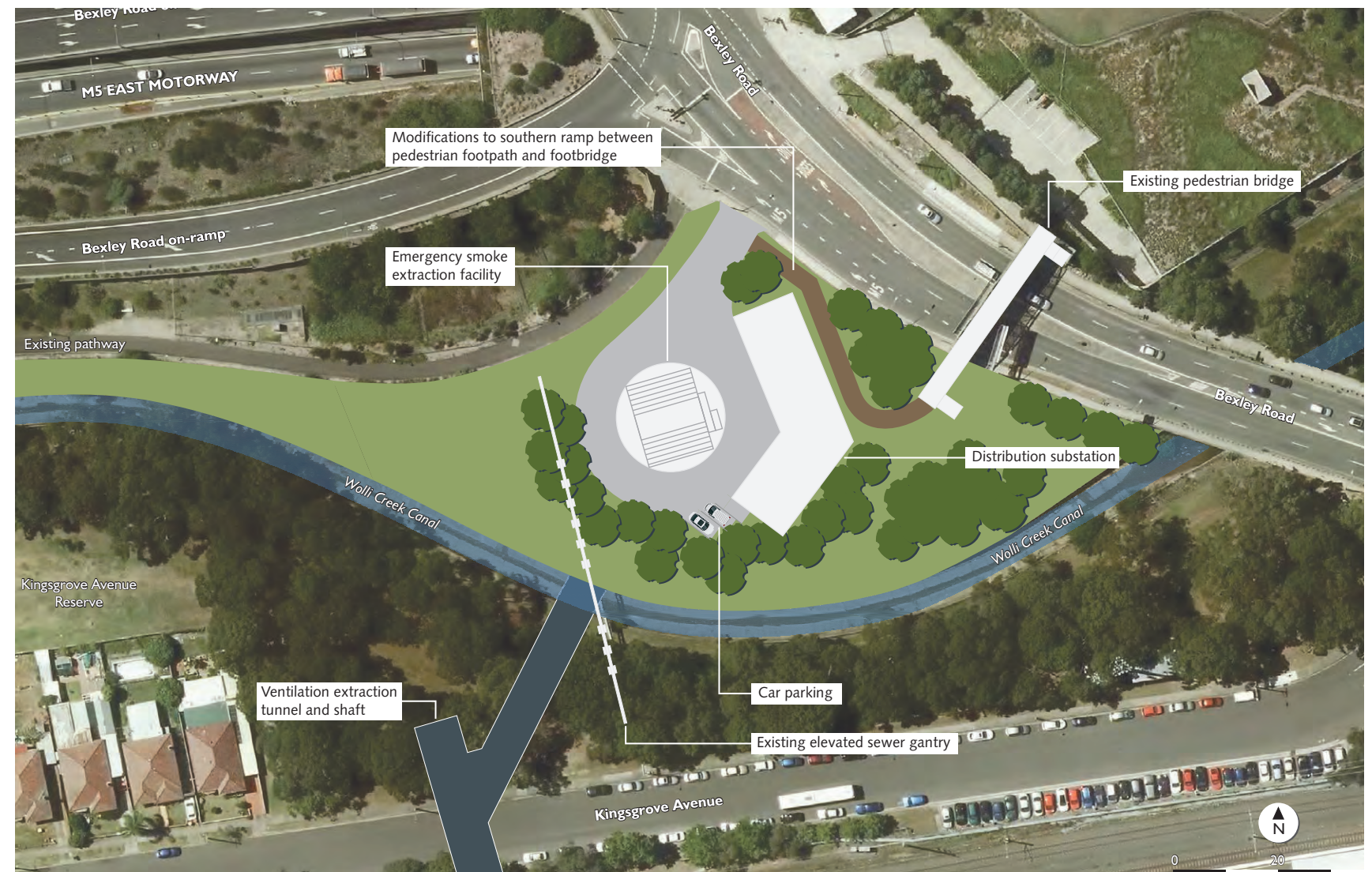


Figure 34 Bexley surface works

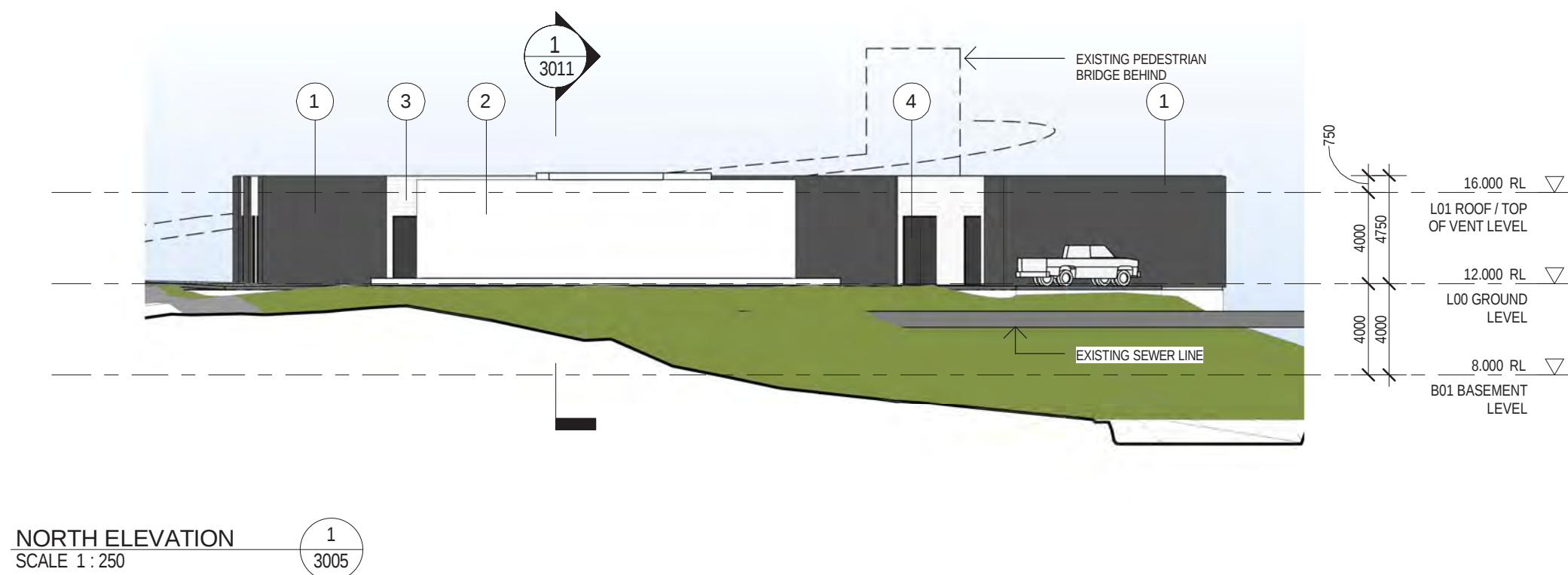
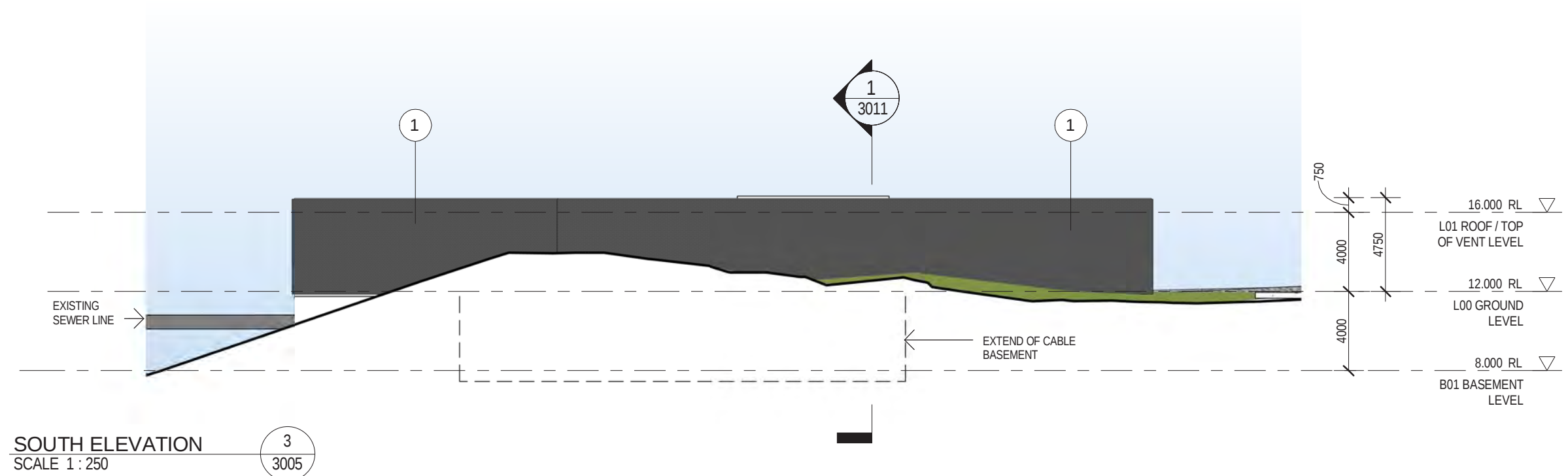
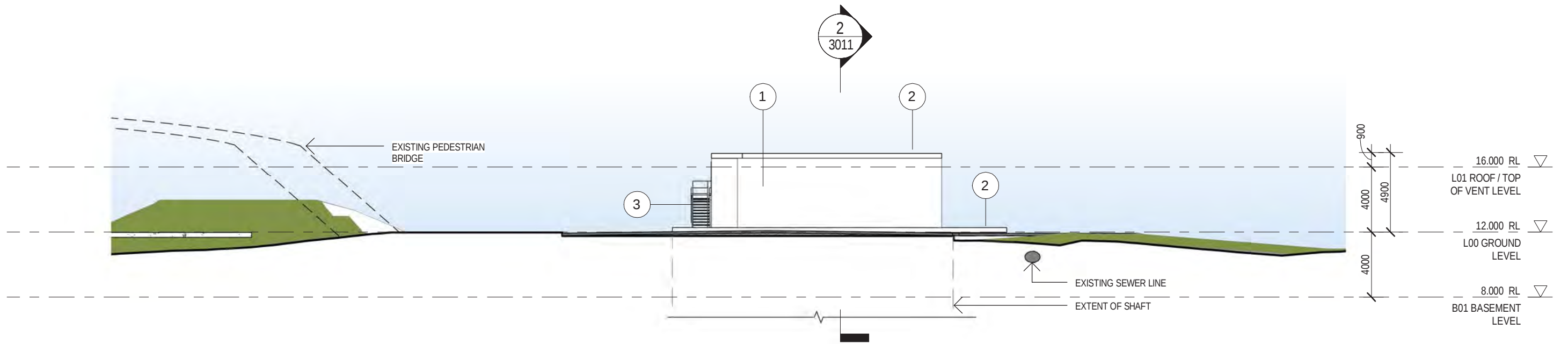
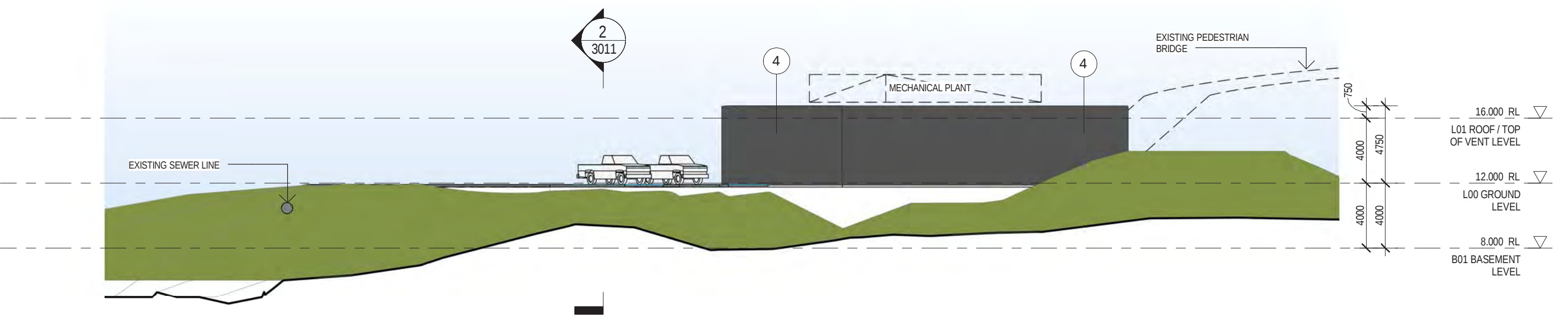


Figure 35 Indicative MOC2 elevations



EAST ELEVATION
SCALE 1 : 250

1
3005



WEST ELEVATION
SCALE 1 : 250

2
3005

Figure 36 Indicative MOC2 elevations



Figure 37 Indicative MOC2 visualisation



Figure 38 Indicative MOC2 perspective



Figure 39 Indicative MOC2 perspective

5.5 Arncliffe

The facility at Arncliffe (Motorway Operations Complex 3 - MOC3) is located at Kogarah Golf Course adjacent to Marsh Street and includes the following:

- Distribution substation
- Water treatment plant
- Ventilation facility, including extraction facility
- Air intake facility

The facilities at Arncliffe have been adjusted to provide maximum offsets to the adjacent RTA ponds for the Green and Golden Bell Frog. Landscape areas will be restored with new areas of turf and tree planting to screen the proposed facilities and match in with the existing parkland character of the site

Design intent

A ventilation facility is located in the south eastern corner of the compound, with vertical fans located below ground. A distribution substation is located to the west of the facility. A water treatment plant is also provided to the north of the site along with an air supply vent station.

Materials, colours and finishes

The distribution substation and water treatment plant are clad in dark face brick on structural concrete block work. Openings providing service access to the plant rooms are grouped in a similar manner to the other distribution substations with common recesses exposing bands of the structure – a smooth-faced concrete block (stack bond pattern). Access doors within the block work are painted a light grey to match.

Materials and finishes for the ventilation facility would be designed in line with the methodology outlined in section 5.2.



Figure 40 Arncliffe MOC3 site plan

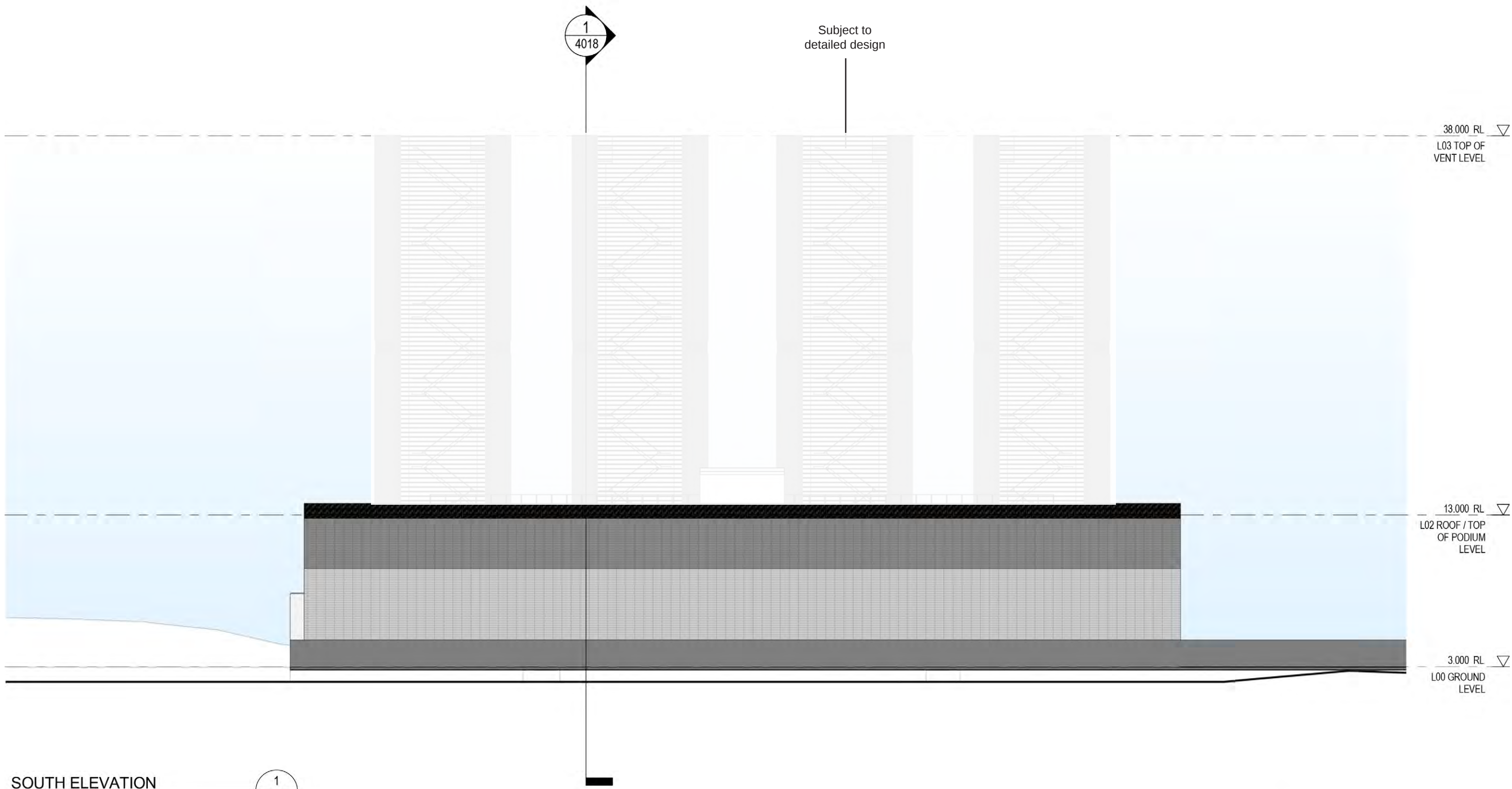


Figure 41 MOC3 ventilation facility south elevation

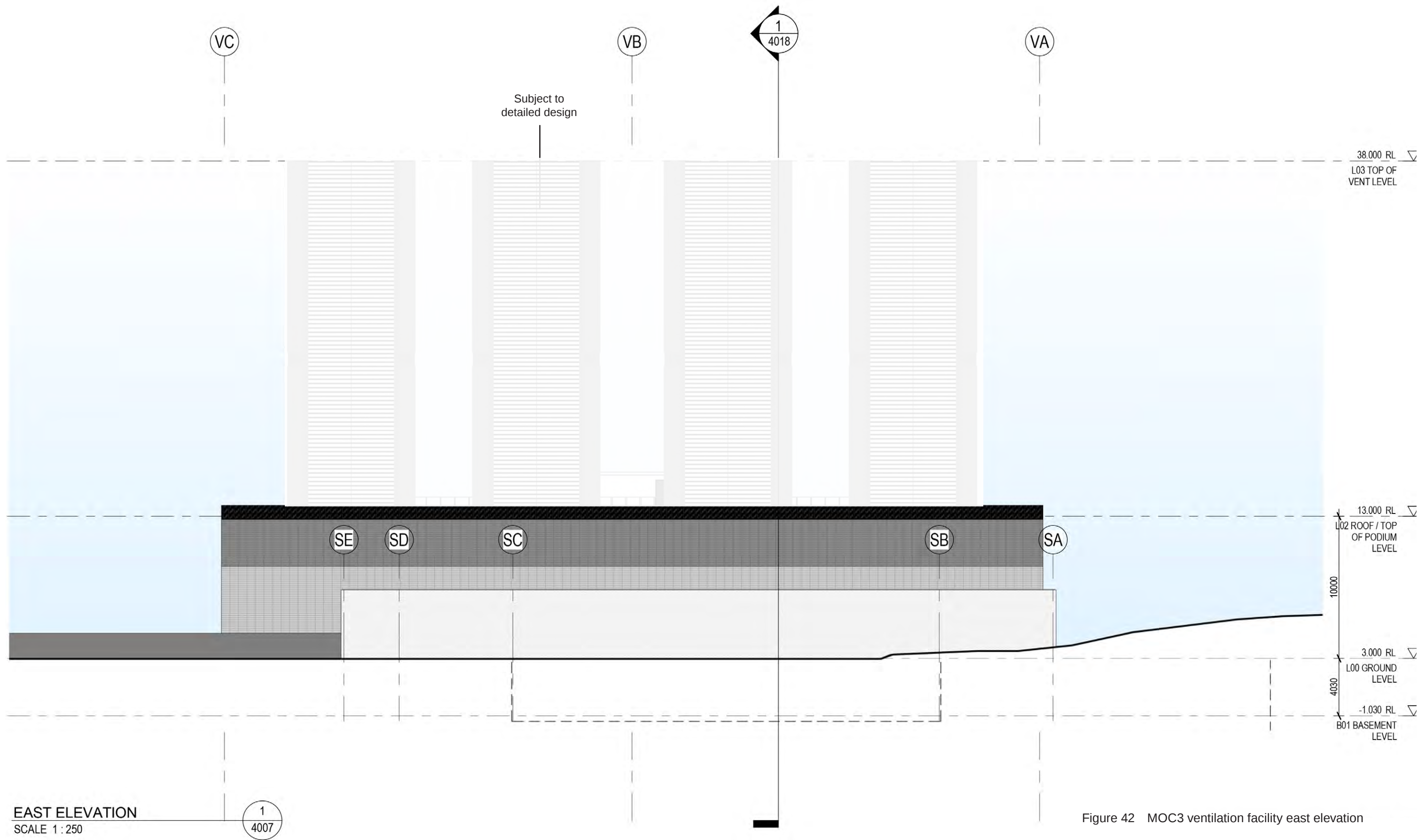


Figure 42 MOC3 ventilation facility east elevation

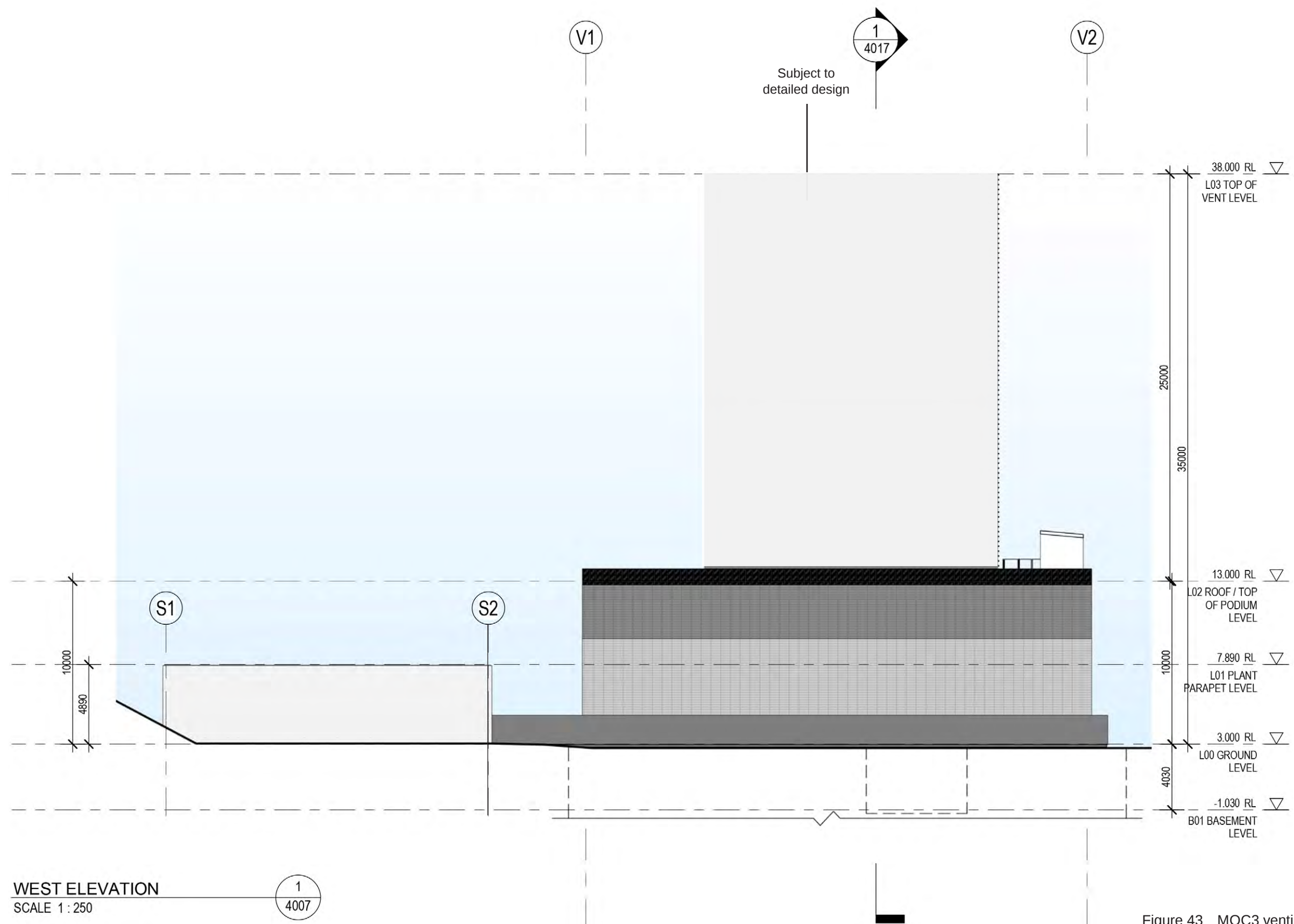


Figure 43 MOC3 ventilation facility west elevation

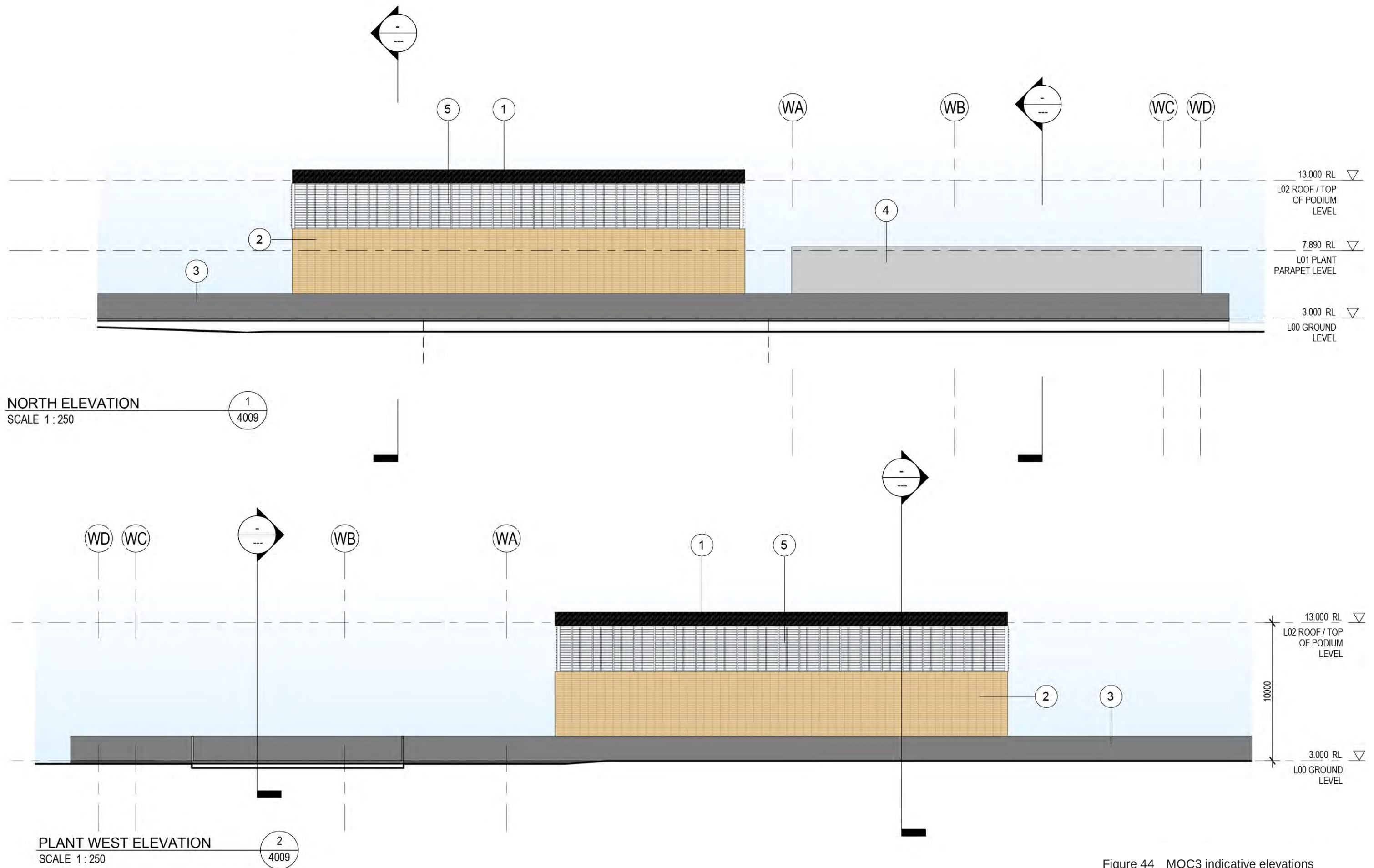


Figure 44 MOC3 indicative elevations

5.6 Tunnels

A large portion of New M5 would be in tunnel. Components of the tunnel include the tunnel lining, roof, lighting, on/off ramps and safety breakdown bays.

Traditionally, tunnels can be uninspiring and homogenous, unreflective of place and disconnected from time. The New M5 would set the benchmark in improving tunnel travel experiences and an opportunity to celebrate tunnel infrastructure.

Design intent

The predominant aim is to create a unique identity for the Westconnex tunnel experience. The New M5 tunnel identity would be consistent with the Westconnex M4 East Stage 1B tunnel through the inclusion of six key elements:

- Portal dive structures with integrated feature lighting (see section 4.2.3)
- Short sections providing architectural variation with 'black' panel inserts at around 1 kilometre intervals
- Location suburb identifiers with custom image panels
- A 'mid tunnel event'
- Coloured feature lighting at selected locations and coloured lining panels within breakdown bays
- All safety and emergency exit signage requirements.

Materials, colours and finishes

Key elements of the proposal are:

- Near side (left side) treatments:
 - Standard 'white' compressed fibre cement epoxy coated lining panels
 - Short sections with variable width panel inserts (coloured black, white and silvery grey) at approximate 500 metre intervals (mainline only) that would introduce a textural effect as a contrast to the standard white panel, providing a subtle variation in visual rhythm to reduce monotony
- Custom image panels as location identifiers at around two kilometre intervals
- Custom coloured panels at breakdown bays
- Off side (right side) treatments:
 - Standard 'white' compressed fibre cement epoxy coated lining panels
 - Cross passages for emergency use occur at 120 metre intervals and would be marked by the use of 'Jade Green' running man symbols.

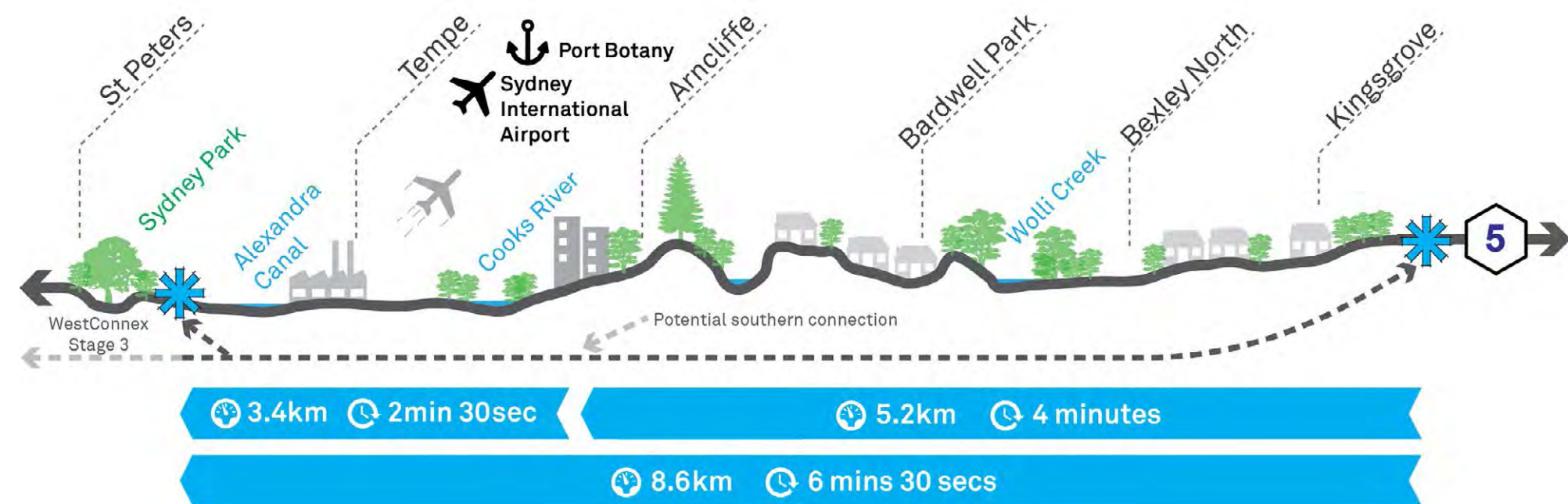


Figure 45 New M5 journey

5.6.1 Location identifiers

The strategy for tunnels includes offering the traveller elements that add interest, provide orientation and a sense of enjoyment. These elements can assist in reducing driver fatigue and increasing awareness.

On near side linings, 'location identifiers' that inform motorists' orientation to above ground features would be provided. These identifiers would also include a section of linear feature lighting providing an additional layer of interest.

These identifiers would occur at around two kilometre intervals in both eastbound and westbound tunnels- approximately every one minute, thirty seconds along the journey at 80 kilometres per hour. Travelling from the western connection east towards the city, the motorist would past by the following indicative location markers:

- **BEXLEY NORTH**
- **ARNCLIFFE**
- **TEMPE**

The 'location identifiers' would be coordinated with tunnel safety features to ensure that legibility of safety features would not be compromised.

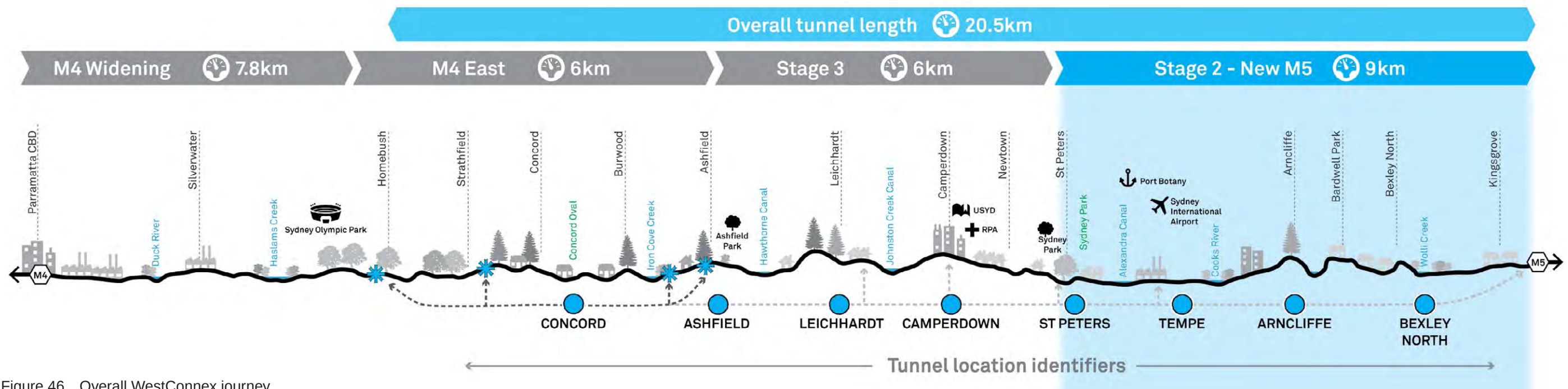


Figure 46 Overall WestConnex journey

5.6.2 Tunnel feature lighting

Lighting strategies have been developed to reduce the impacts of monotony within tunnels. The design would provide the following key lighting elements:

Dive structures (Type 'A')

Western tunnel dive approach structures would feature walls with a composite metal cladding coloured 'silver grey' with staggered lighting rebates. Feature LED strip lighting would create a refined 'glow' from within the rebates and a subtle 'wash' of light across cladding panels.



Figure 47 Visualisation of western portal eastbound entry

Typical tunnel lining effect (Type 'B')

This feature would include around 100 metre sections with variable width 'white', 'black' and 'silver grey' panel inserts with LED strip lighting between panels. These sections occur at around 500 metre intervals throughout the tunnel.

The LED lighting, when combined with the variable width coloured panels, would create a contrast to the standard white panel and provide a subtle variation in visual rhythm.



Figure 48 Visualisation of tunnel lining effect

Typical tunnel location identifier (Type 'C')

Custom image panels would be used to highlight the location of the suburb above at around 2 kilometre intervals to assist with driver orientation. Approximate 100 metre sections of 'White' translucent polycarbonate illuminated panels with variable LED lighting effects would be used, adding visual interest and variety for the motorist.



Figure 49 Visualisation of tunnel location identifier

Breakdown bays (Type 'D')

Feature custom coloured 'yellow' lining panels at breakdown bays would be complemented with feature lighting, marking the location of the breakdown bay in contrast with main tunnel lining panels.



Figure 50 Visualisation of breakdown bay

Mid tunnel event (Type 'E')

The mid-tunnel event would feature select 'graphic' panels with LED strip lighting to panel joints, and concealed LED floodlighting to ceiling panels. It would become a memorable marker in this section of the tunnel providing drivers with an understanding of where they are in the total tunnel journey. It would feature 'select graphic' lining panels laid parallel to the road alignment, in contrast to the standard vertical alignment, and extending to the full height of the tunnel and partially wrapping across the tunnel ceiling over lane shoulders. LED strip lighting would be included in the panel joints providing a range of programmable lighting effects.

The final arrangement of this mid-point tunnel statement, along with the other tunnel feature elements, would be subject to further detailed investigation of road safety, tunnel lighting and wider driver behaviour considerations, and design development.



Figure 51 Visualisation of mid tunnel event