

4.0 Portals

4.2 Principles

The guiding principles in the development of designs for these elements are to:

- Ensure that design excellence is an identifying hallmark of the driving experience;
- Create a safe, welcoming, memorable and well designed portal experience;
- Provide an integrated approach across all visible elements;
- Ensure that the dive structures and portals reinforce the objectives of linear identity; and
- Design the portals and associated landscape and structure to be a modern urban expressway, featuring state of the art technology and safety.

4.3 Strategies

Strategies to ensure the successful application of the guiding principles are to:

- Provide cohesive, seamless, modern, simple and robust design themes for portals and dive structures;
- Provide cladding systems for portals and dive structures which achieve durability;
- Integrate lighting, emergency services, barriers, traffic management systems and other visual elements into the overall design;
- Implement new safety techniques into the urban and landscape design, blending with a brief visual experience at the tunnel approaches; and
- Maximise landscape opportunities around portals and dive structures.

The portal design has been kept deliberately simple and unobtrusive to avoid adding clutter to the urban environment or the complex road geometry necessary to facilitate their operation. Elements such as wayfinding signage and tolling gantries are located adjacent to portals and dive structures, further necessitating their understated design.



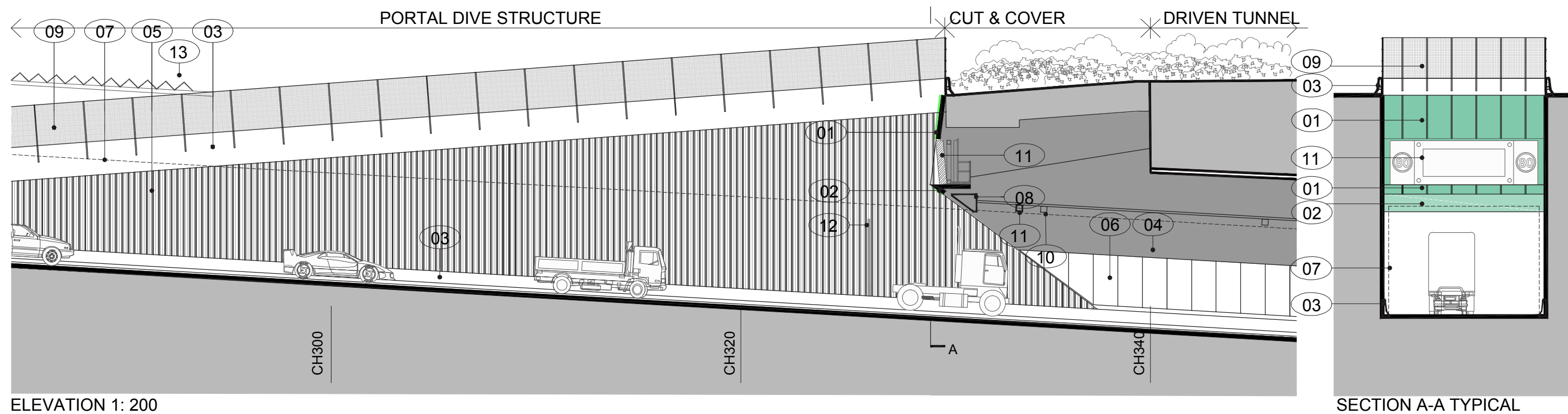
SOUTH PORTAL DIVE STRUCTURE - SOUTHBOUND TUNNEL OFF RAMP TO PENNANT HILLS ROAD - VIEWLOOKING NORTH

M1-M2-5000-DR-UD-0911

Artist's Impression Only

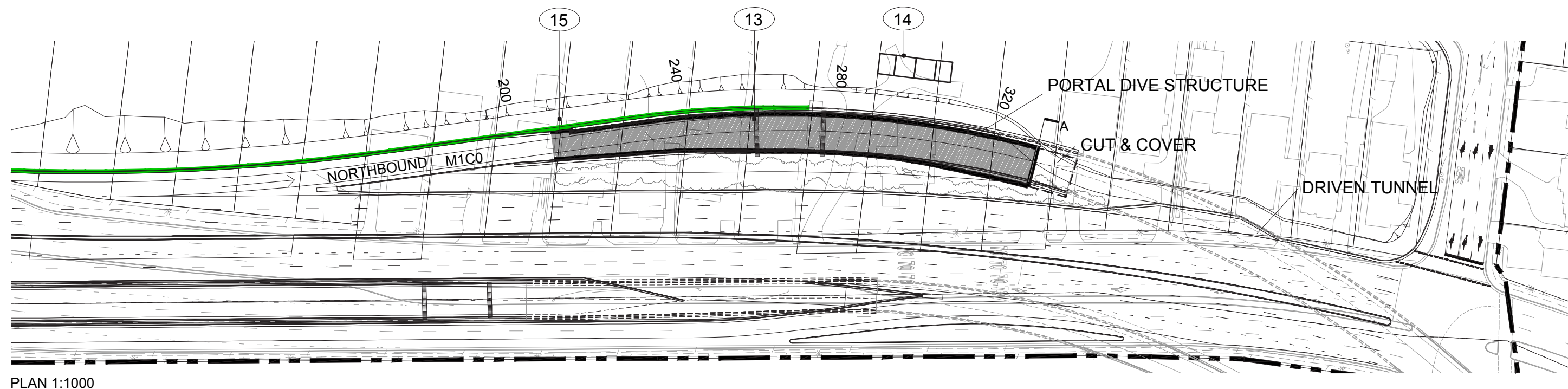


M1-M2-5000-DR-UD-0912
NORTHERN PORTAL - VIEW ALONG SOUTHBOUND ENTRY PORTAL



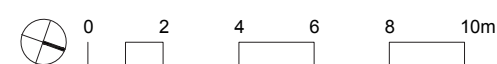
ELEVATION 1: 200

SECTION A-A TYPICAL



PLAN 1:1000

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| 01 | FEATURE COLOURED GRC PANEL | 04 | TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 | VEHICLE ENVELOPE | 10 | TUNNEL LIGHTING | 13 | TOLL GANTRY |
| 02 | FEATURE COLOURED GRC PANEL UNDERCROFT | 05 | ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 | OVERHEIGHT VEHICLE BARRIER | 11 | ITS SIGNAGE | 14 | TOLL GANTRY TECHNICAL SHELTER + GENERATOR |
| 03 | TYPE F CONCRETE BARRIER | 06 | TUNNEL LINING VITRE PANELS | 09 | THROW SCREEN - TYPICAL 3M HIGH | 12 | BOOM GATES | 15 | SHARED PATH |

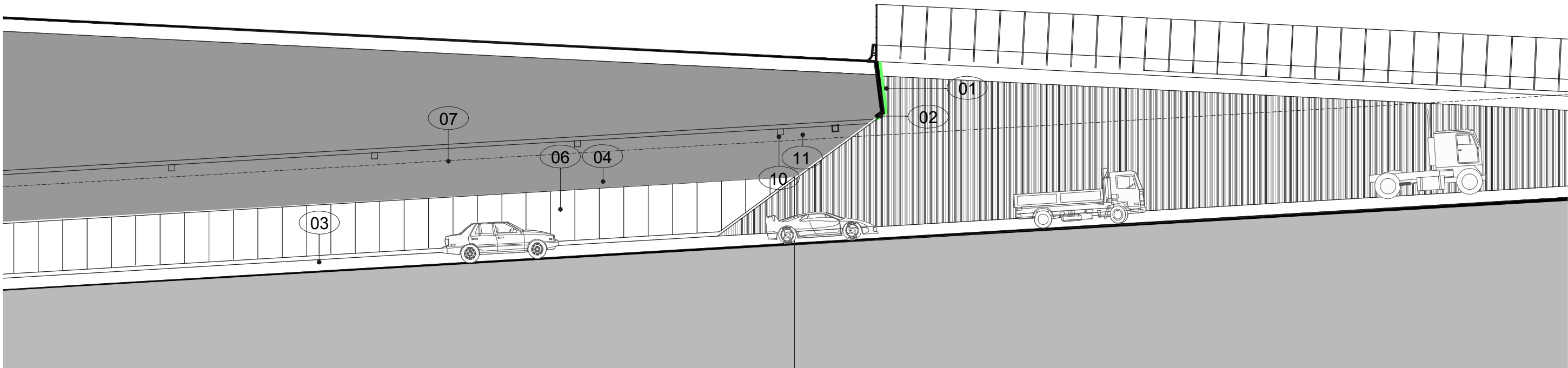


SCALE 1:200@A3

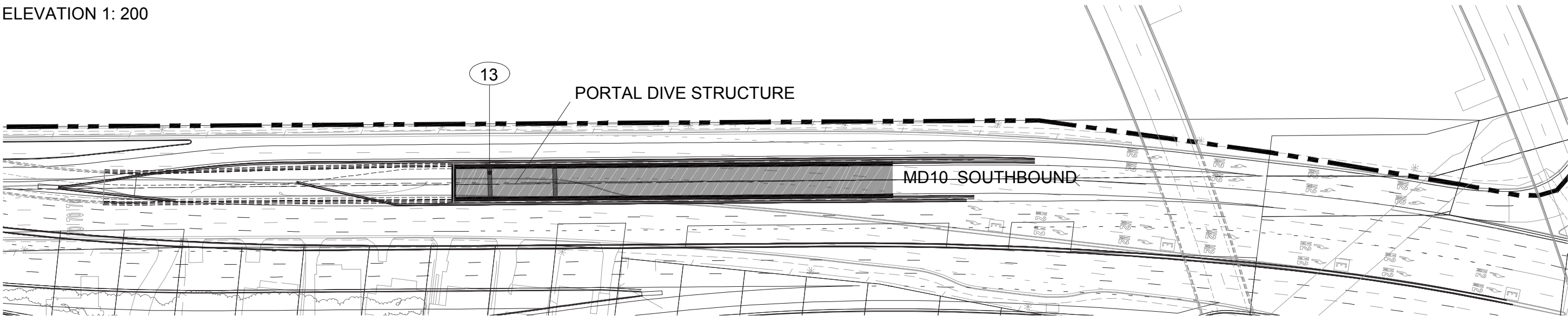
LANDSCAPE SHOWN IS INDICATIVE

SOUTH PORTAL DIVE STRUCTURE - NORTHBOUND TUNNEL ON RAMP FROM PENNANT HILLS ROAD - CHAINAGE M1C0

M1-M2-5000-DR-UD-0303

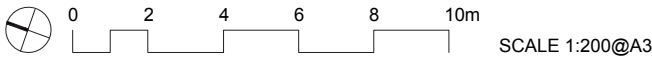


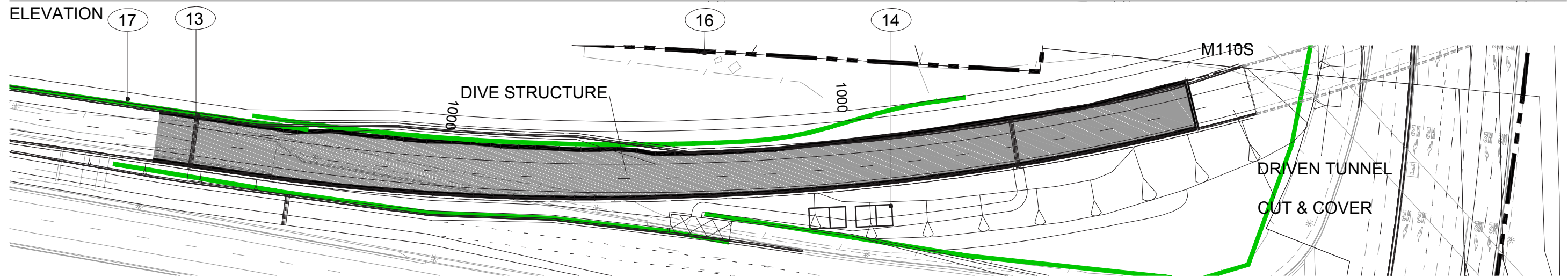
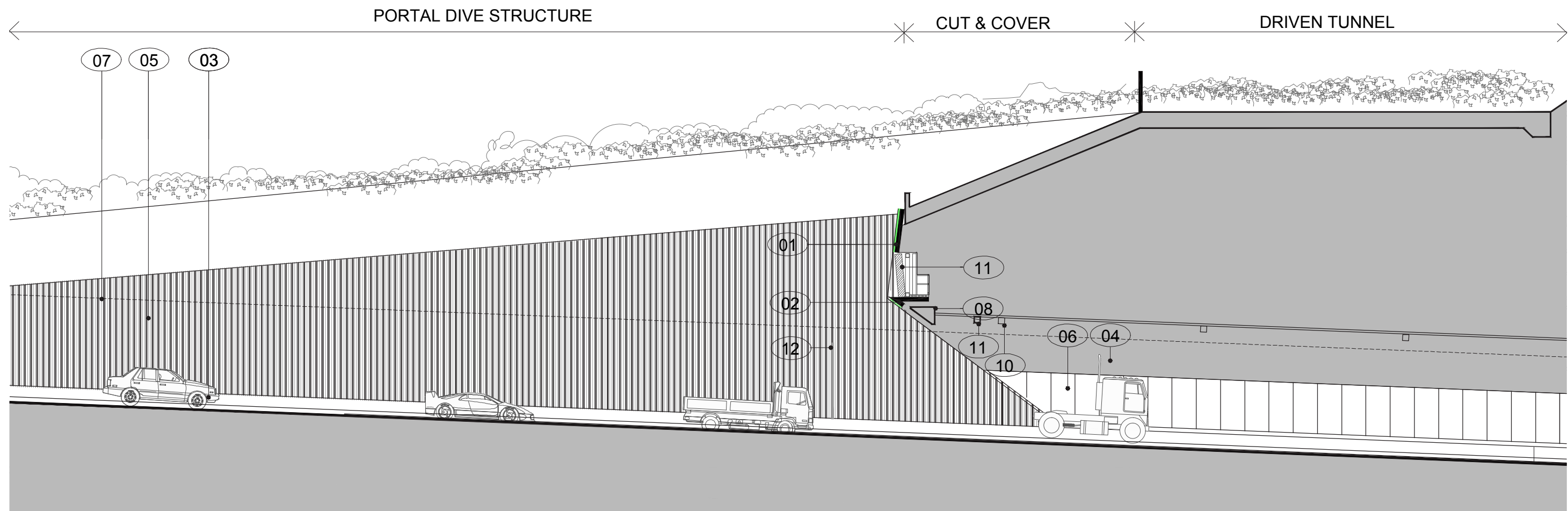
ELEVATION 1: 200



PLAN 1:1000

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| 01 FEATURE COLOURED GRC PANEL | 04 TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 VEHICLE ENVELOPE | 10 TUNNEL LIGHTING | 13 TOLL GANTRY |
| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 BOOM GATES | 15 SHARED PATH |





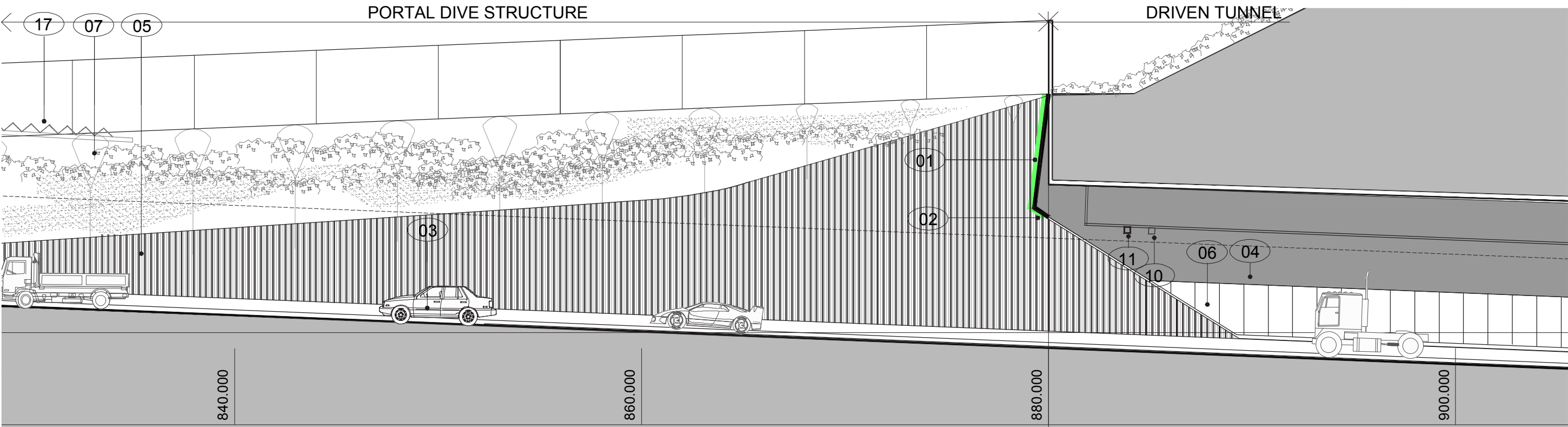
- PLAN 1:1000
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| 01 | FEATURE COLOURED GRC PANEL | 04 | TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 | VEHICLE ENVELOPE - 5.3M | 10 | TUNNEL LIGHTING | 13 | TOLL GANTRY | 16 | PROJECT BOUNDARY |
| 02 | FEATURE COLOURED GRC PANEL UNDERCROFT | 05 | ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 | OVERHEIGHT VEHICLE BARRIER | 11 | ITS SIGNAGE | 14 | TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 | NEW NOISE WALL |
| 03 | TYPE F CONCRETE BARRIER | 06 | TUNNEL LINING VITRE PANELS | 09 | THROW SCREEN - TYPICAL 3M HIGH | 12 | BOOM GATES | 15 | SHARED PATH | 18 | EXISTING NOISE WALL TO BE RETAINED |

LANDSCAPE SHOWN IS INDICATIVE

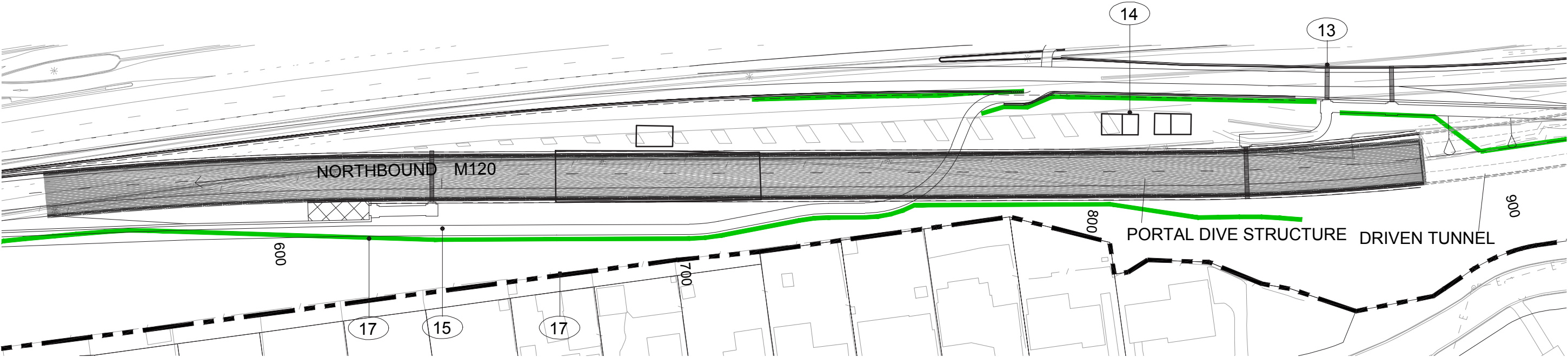


SOUTH PORTAL DIVE STRUCTURE - NORTHBOUND TUNNEL ON RAMP FROM HILLS M2 MOTORWAY EASTBOUND - CHAINAGE M110

M1-HILLS M2 MOTORWAY-5000-DR-UD-0305



ELEVATION 1: 200



PLAN 1:1000

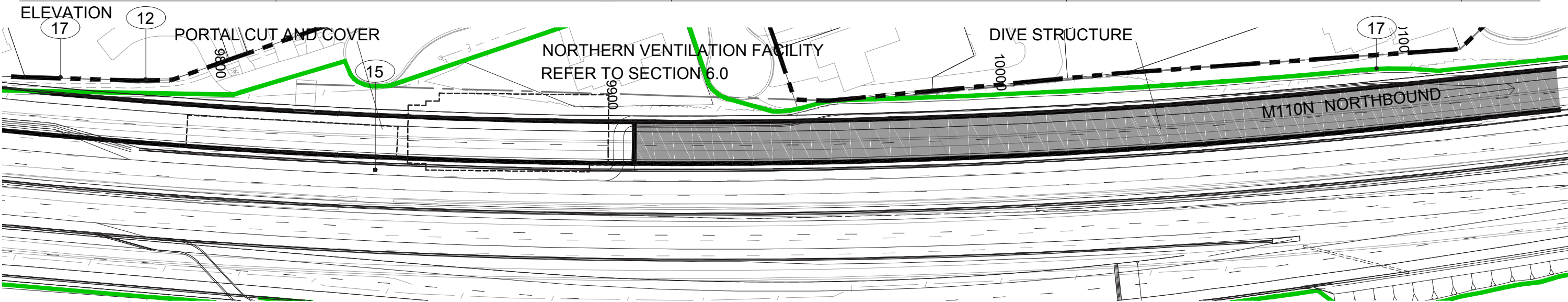
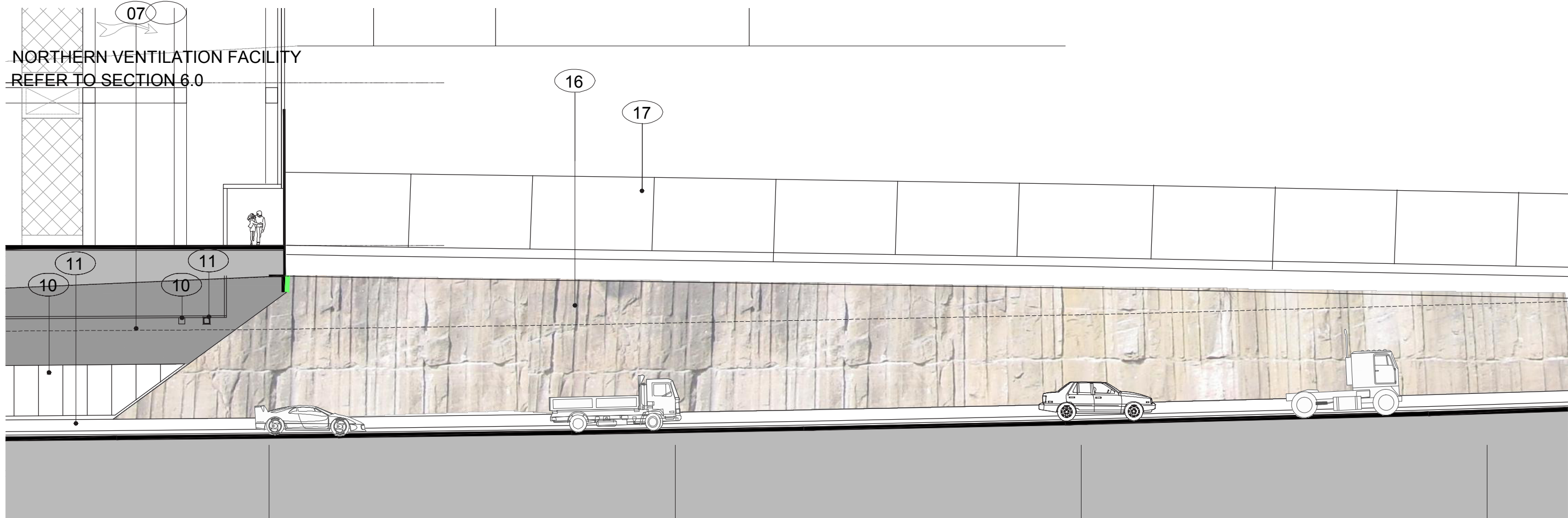
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| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 NEW NOISE WALL |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 BOOM GATES | 15 SHARED PATH | 18 EXISTING NOISE WALL TO BE RETAINED |



SCALE 1:200@A3

SOUTH PORTAL DIVE STRUCTURE - SOUTHBOUND TUNNEL OFF RAMP TO HILLS M2 MOTORWAY WESTBOUND - CHAINAGE M120

M1-M2-5000-DR-UD-0306

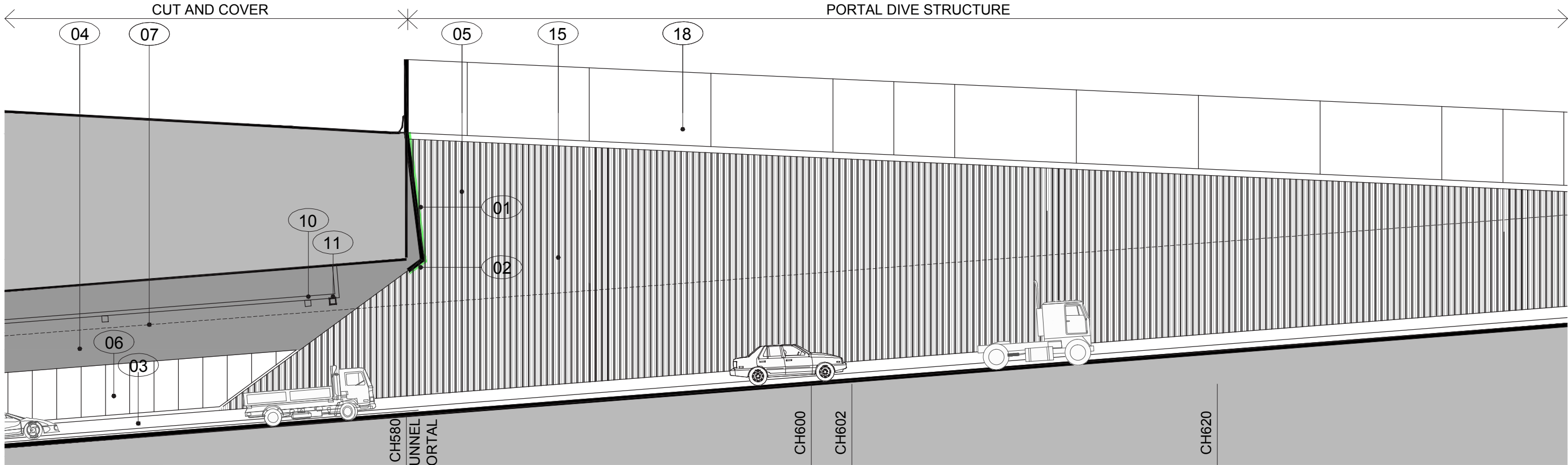


PLAN 1:1000

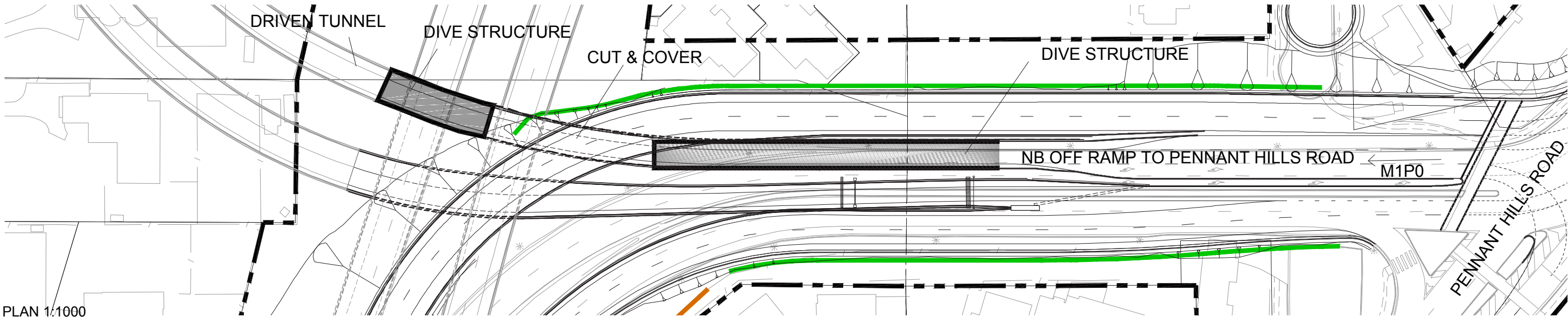
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| 01 FEATURE COLOURED GRC PANEL | 04 TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 VEHICLE ENVELOPE | 10 TUNNEL LIGHTING | 13 TOLL GANTRY | 16 EXPOSED SANDSTONE ROCKFACE |
| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 NEW NOISE WALL |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 PROJECT BOUNDARY | 15 SHARED PATH | 18 EXISTING NOISE WALL TO BE RETAINED |

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SCALE 1:200@A3

NORTH PORTAL DIVE STRUCTURE - NORTHBOUND TUNNEL OFF RAMP TO M1 PACIFIC MOTORWAY - CHAINAGE M110



ELEVATION 1:200



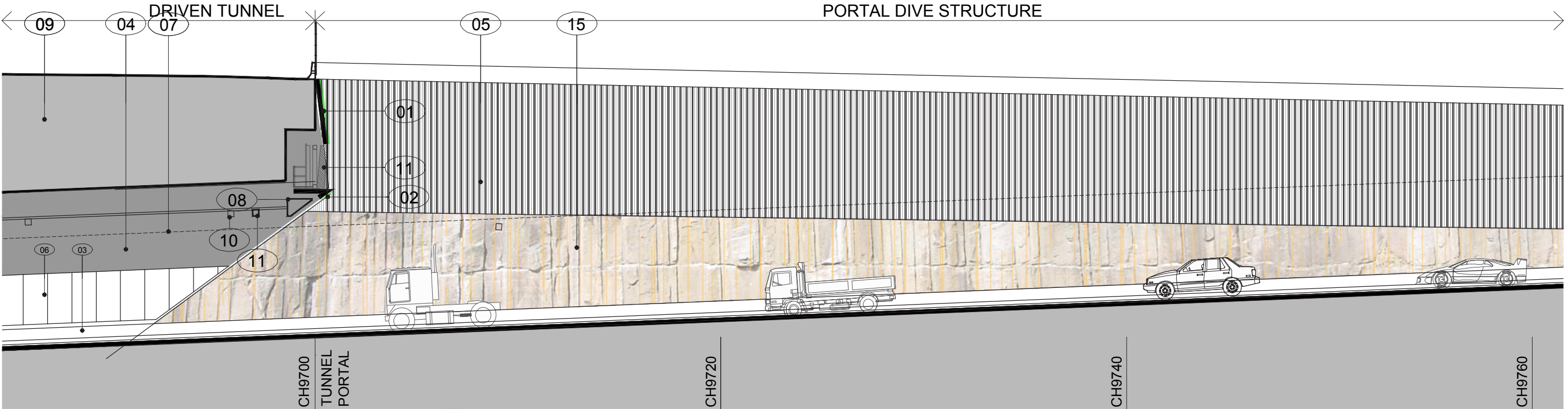
PLAN 1:1000

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| 01 FEATURE COLOURED GRC PANEL | 04 TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 VEHICLE ENVELOPE | 10 TUNNEL LIGHTING | 13 TOLL GANTRY | 16 EXPOSED SANDSTONE ROCKFACE |
| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 NEW NOISE WALL |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 PROJECT BOUNDARY | 15 SHARED PATH | 18 EXISTING NOISE WALL TO BE RETAINED |

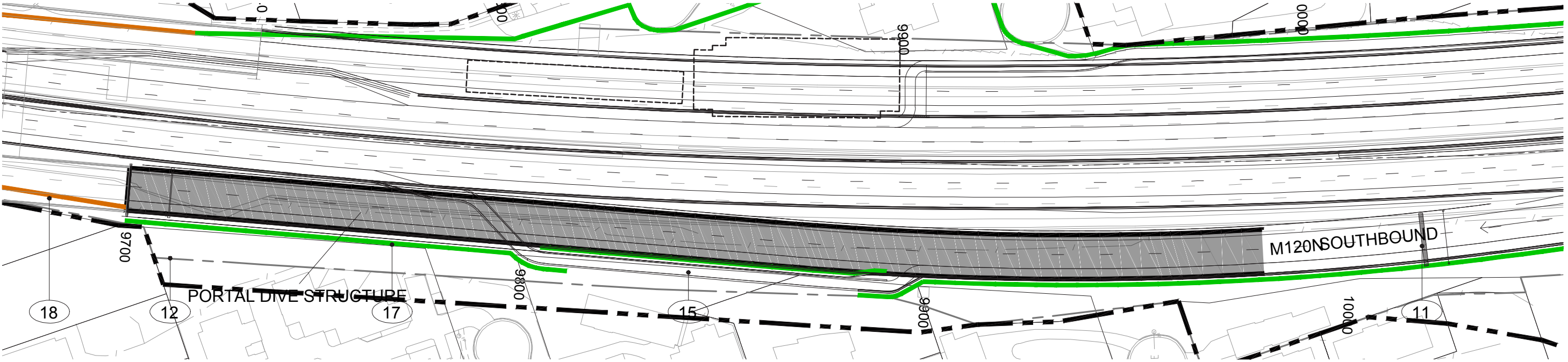


NORTH PORTAL DIVE STRUCTURE - NORTHBOUND TUNNEL OFF RAMP TO PENNANT HILLS ROAD - CHAINAGE M1P0

M1-M2-5000-DR-UD-0308



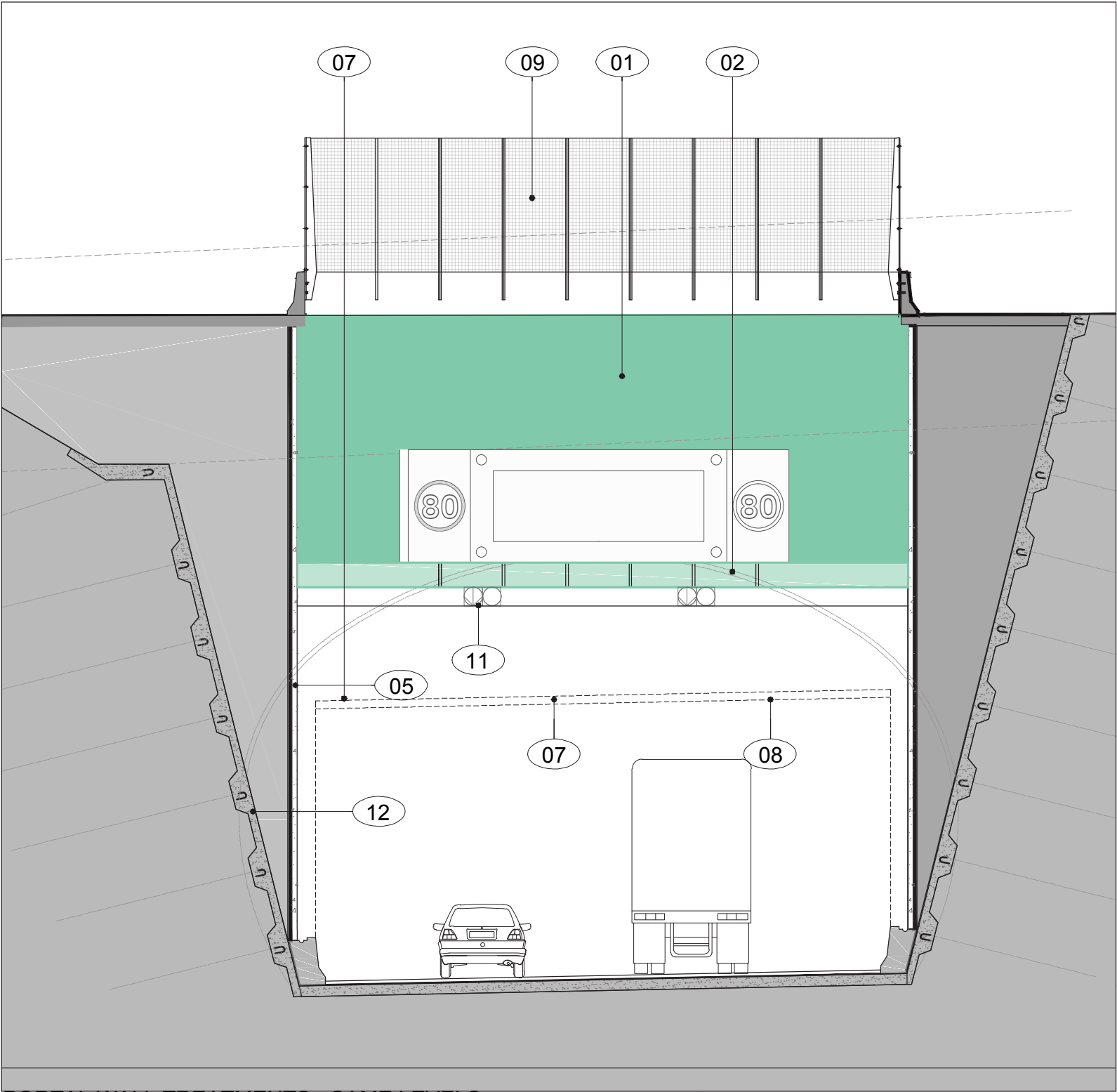
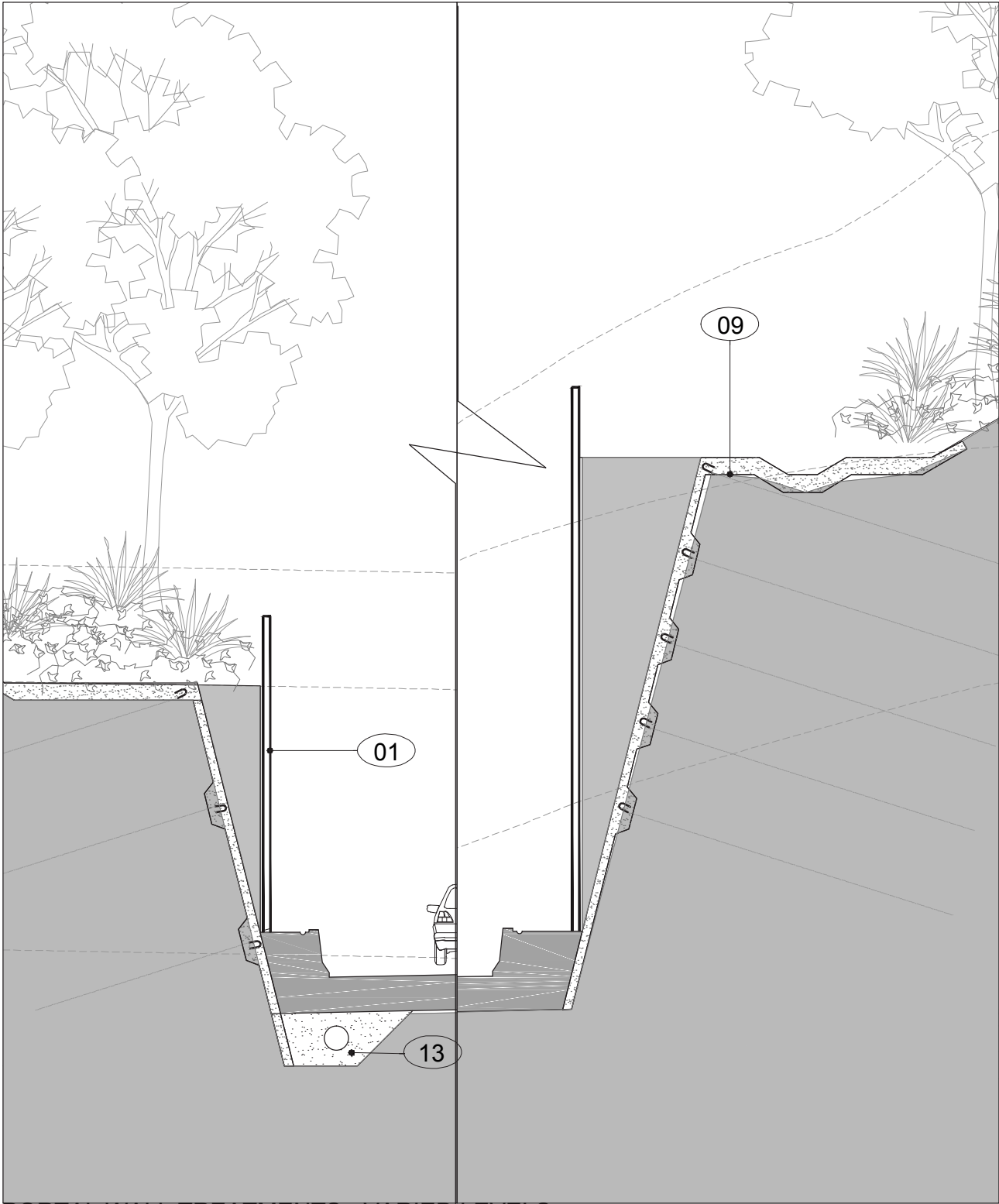
ELEVATION 1: 200



PLAN 1:1000

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| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 NEW NOISE WALL |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 PROJECT BOUNDARY | 15 SHARED PATH | 18 EXISTING NOISE WALL TO BE RETAINED |





PORTAL WALL TREATMENTS - VARIED LEVELS

PORTAL WALL TREATMENTS - SAME LEVELS

- | | | | | | |
|---|--|-----------------------------------|--------------------|--|---------------------------------------|
| 01 FEATURE COLOURED GRC PANEL IN JADE GREEN | 04 TUNNEL SURFACE ABOVE LINING PANELS - BLACK ZONE | 07 VEHICLE ENVELOPE | 10 TUNNEL LIGHTING | 13 DRAINAGE | 16 EXPOSED SANDSTONE ROCKFACE |
| 02 FEATURE COLOURED GRC PANEL UNDERCROFT | 05 ABSORPTIVE ALUMINIUM ACOUSTIC PANELS | 08 OVERHEIGHT VEHICLE BARRIER | 11 ITS SIGNAGE | 14 TOLL GANTRY TECHNICAL SHELTER + GENERATOR | 17 NEW NOISE WALL |
| 03 TYPE F CONCRETE BARRIER | 06 TUNNEL LINING VITRE PANELS | 09 THROW SCREEN - TYPICAL 3M HIGH | 12 SHOTCRETE | 15 SHARED PATH | 18 EXISTING NOISE WALL TO BE RETAINED |



5.0 Tunnel

5.1 Introduction

The tunnel, as the primary experience of the project, forms the main element for understanding the urban design concept for the NorthConnex.

This section includes elements of the tunnel, such as tunnel cladding and all associated and visible services and utilities such as barrier systems, detection and security systems, overhead barriers, and cabinets.

5.2 Principles

The guiding principles in the development of designs for these elements are to:

- Ensure that design excellence is an identifying hallmark of the tunnel experience;
- Create a safe, welcoming, memorable and well designed tunnel experience; and
- Provide an integrated approach across all visible elements;
- Ensure that the tunnel experience reinforce the objectives of linear identity.
- Provide a tunnel narrative that translates the existing experience of travelling along Pennant Hills Road to the new experience of travelling through the tunnel.

5.3 Strategies

Strategies to ensure the successful application of the guiding principles are to:

- Provide cohesive, seamless, modern, simple and robust design themes for portals and dive structures;
- Provide cladding systems for the tunnel linings which achieve durability;
- Integrate lighting, emergency services, barriers, traffic management systems and other visual elements into the overall design; and
- Implement new safety techniques into the urban and landscape design, blending with a brief visual experience at the tunnel approaches and within the tunnel.

The use of lightweight panels for the tunnel cladding provides numerous advantages including:

- A high quality finish and related detailing;
- Light weight cladding facilitating economical construction; and
- Achieves the required durability, colour and maintenance requirements.

Tunnel linings consist of several key features:

- Modular sizes;
- Vertical panel systems;
- Integral colours; and
- A concealed fixing system.

Provide a tunnel narrative that translates the existing experience of travelling along Pennant Hills Road to the new experience of travelling through the tunnel.



Artist's Impression Only



M1-M2-5000-DR-UD-0981
TUNNEL INTERIOR - 'VISUAL EVENTS' SPECIAL FEATURE - IN CURVED ALIGNMENT

5.0 Tunnel

5.4 Tunnel Concept

The tunnel is seen as a gateway and transition element within the larger geographic area. It can be understood as a link from the urban area to the natural area of the coast.

Key tunnel issues include:

- Tunnel safety – Maintaining operational criteria of all safely features;
- Perception of safety – Maintaining driver recognition of safety features within the tunnel;
- Driver fatigue – Providing interest along the journey and avoiding fatigue due to a repetitive visual environment;
- Driver orientation – Providing awareness of where drivers are in Sydney or how far along their journey they have travelled; and
- Driver distraction – Adding interest to the experience without compromising road awareness.

Tunnel safety can be maintained by providing required safety equipment, cross passages, breakdown bays and other elements. These are taken as starting points for safety.

Another major part of providing a safe tunnel environment is the attitude of drivers. They would by far make up the largest group of people using the tunnel and would effectively be a key stakeholder in ensuring safety within the tunnel. Elements that add interest, provide orientation and provide a sense of enjoyment to the journey can assist in reducing driver boredom and fatigue with a resulting improvement in awareness.

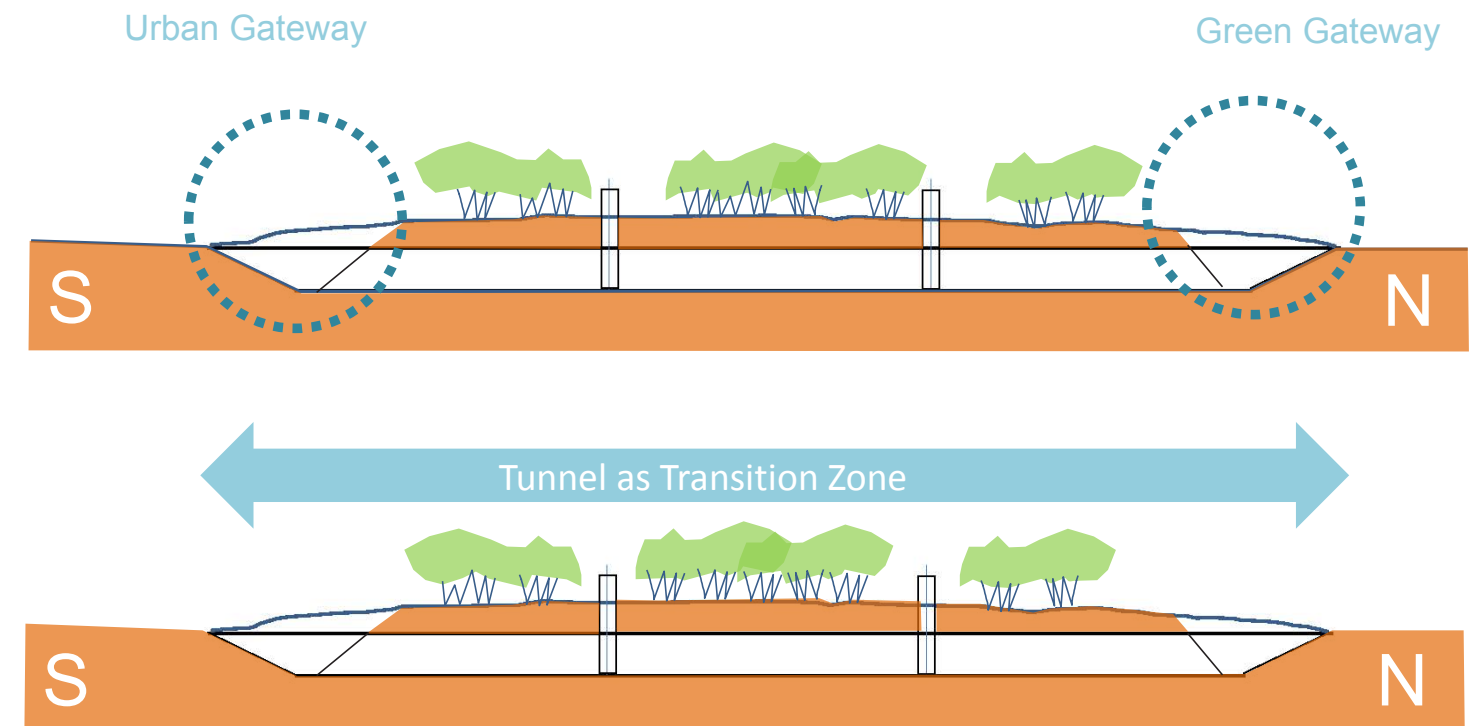
When considering the above ground driver experience there are any number of visual elements that provide interest, orientation and stimulation to the journey. The open views provided by the configuration of the M1 Pacific Motorway as it traverses the Hawkesbury provide visual delight and an experience to look forward to as one travels along the coast. They also provide a strong sense of orientation and a clear measure of one's progress along the journey. A tunnel environment generally lacks these markers and can become a tedious and claustrophobic experience. This condition makes it more difficult to capitalise on the major potential for drivers to enhance the safety of their tunnel journey.

The tunnel strategy for the project therefore has been developed around enhancing the idea of the tunnel as a gateway between different parts of the Sydney and the idea that orientation and interest are central to the realisation of safety.

The travel time in the NorthConnex tunnel at free flow would be approximately eight minutes which is a significant time to be travelling below ground devoid of the usual visual stimuli that engender attentiveness and alertness.

5.5 Tunnel Narrative Objectives

- Provide orientation to above ground features and add driver interest within the tunnel;
- Provide reference to easily recognised and publicly accessible places;
- Develop 'visual events' at approximately two minutes apart;
- Provide visual changes of significant magnitude to be experienced by drivers focused on the road;
- Provide gradual transitions to 'visual events' to avoid driver distraction; and
- Coordinate 'visual events' with tunnel safety features to ensure that legibility of safety features is not compromised.



5.0 Tunnel

5.6 Tunnel Narrative ‘Visual Events’

The narrative has been built around the surface narrative that is already familiar to drivers using this corridor. The tunnel narrative is a distillation of this narrative, a projection of some of the key surface elements into the underground experience of the tunnel.

Key attributes include:

- Gateway experiences at northern and southern interchange portals are highlighted with panels and special lighting;
- Reference ‘visual events’ to Observatory Park in the south and Brickpit Park in the north. These are first and foremost public places that can be visited and experienced. They are accessible to all and provide both visual and social reference points along the corridor;
- Feature lighting is provided to add emphasis and ‘change the mood’ for a short duration to provide further relief from the standard tunnel experience;
- A further enhancement could be the inclusion of the referenced place name. In large text the name ‘Observatory Park’, or ‘Brickpit Park’ could be placed on the panels. This text would need to be large enough to be legible at driver speed without diverting from the view of the road. Further detailed analysis would be required to determine the optimum size and spacing of any text. The illustration on the previous page provides an indicative view of one potential outcome; and
- Association of the ‘visual events’ with the driving experience of surface travel in terms of orientation, progress, and interest; and
- Use of the movement of driving to ‘activate’ the experience of the visual event allowing the driver to participate in the realisation of the ‘visual event’

