

04 System Wide Components



Cover Image: Artist Impression of Bella Vista Station Public Domain. Source: Ai3D.

4.1 Introduction and Scope

In keeping with the 'Kit of Parts' approach to the design on the Sydney Metro Northwest project, a coordinated and integrated suite of solutions for urban, landscape and architectural design has been adopted. The approach allows the seamless transition in treatments from the precinct to the detailed scale.

This section presents a summary of the design principles and initiatives for the main components of the project to address the requirements of Condition C44(a) - C44(i). These principles and initiatives show how the strategies and themes outlined in Section 2 of this UDCLP have been applied system wide and have informed the detailed design of the facilities in the various project precincts as described in Section 3 of this UDCLP.

4.2 Design Initiatives to Integrate Rail Infrastructure, Stations and Facilities into their Existing and Proposed Settings

The design initiatives and principles to integrate rail infrastructure stations and facilities into their existing and proposed settings, are summarised in this section, with reference to the civic interface and modal integration.

4.2.1 Precinct Interface

The urban design of the stations and their precincts establishes the framework in which the stations can assert a civic presence and create strong connections into their adjacent communities. The establishment of stations as key points of focus within their precincts by the configuration of roads and access pathways, provides the opportunity for stations to assert a presence, establish an identity in the local public domain, as well as act as an exemplar to catalyse new development in the precinct. The public domain design approach creates the opportunity for the station architecture to express itself within the precinct as well as provide for the comfort of rail patrons and community amenity. By building and reinforcing a connection between the stations and the communities they serve, anti social behaviour and malicious damage to the station asset can also be minimised.

Civic Interface

Principles

- Create an urban framework to support stations as focal points for communities.
- Develop an architectural language that supports and reinforces the opportunities created by introducing the station or rail facility into the urban realm.
- Stations to be of their communities as well as of the infrastructure to which they belong.

Initiatives

- Roads and pedestrian/cycle connections to stations focus on and provide prominence to station locations.
- Plazas adjacent to entry points assert a presence in the public domain.
- Materials and appropriate scale support a civic presence in the station's architectural expression.
- Arrangement of hard and soft landscaping creates a sense of civic space to entry points.
- The art program, which responds to and promotes local identity is embedded in the public domain.

Plazas

Principles

- An appropriately scaled plaza shall integrate the station entrance, street frontage, pedestrian crossing point and transport interchange facilities to establish a strong local presence
- Ensure pedestrian priority across local streets is aligned with the station entry
- Plaza design shall promote unhindered access from the plaza through to the station entrance.

Initiatives

- Ground levels manipulated to allow smooth and gently walkways as opposed to stairs and ramps where possible
- Feature finishes used adjacent to station entries and priority areas to enhance legibility and wayfinding
- Feature architectural lighting included within station plaza areas
- Shade trees to improve micro climatic conditions are provided
- Clearly defined entry points create a sense of arrival.

Access Streets

Principles

- Create a local street interface with the station
- Promote walking and cycling to the station through provision of shaded, comfortable and safe access streets
- Connect access streets into the existing street network.

Initiatives

- Station entries aligned with street axis for maximum visibility
- Position and setback of the station entrance to accommodate an appropriately sized public plaza
- Minimum vehicle carriageway width and maximum verge for ease of pedestrian crossing and movement
- Continuous connections to the existing street network established where possible
- Acknowledgement of potential development sites, identified in the precinct plans, and potential access points and complementary settings provided where possible.

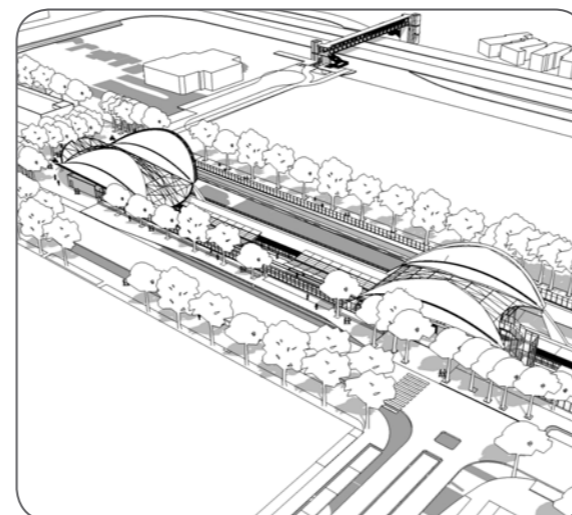


Figure 4.1_Station Precinct (Bella Vista). Source: HASSELL

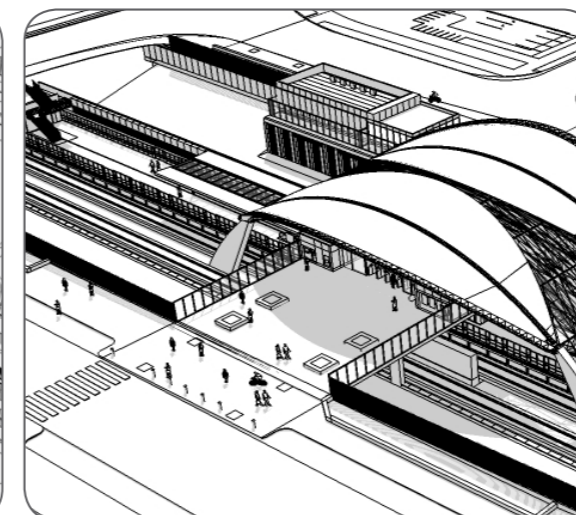


Figure 4.2_Station Primary Plaza. Source: HASSELL

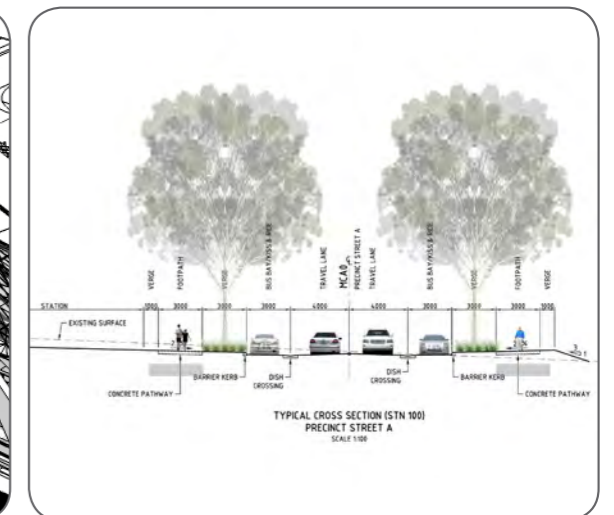


Figure 4.3_Station Access Streets. Source: HASSELL

Pedestrian and Cyclist Linkages

Principles

- Provide direct comfortable and prominent pedestrian connections between station entrances key destinations and the local community
- Provide adequate circulation space for cyclist movement on the street and between the street and the station cycle facilities.

Initiatives

- Straight, clear, well lit and shady pedestrian pathways provided along key desire lines
- Design minimises potential conflict between pedestrian and cycle circulation paths
- Bike racks located in the vicinity of the station entrance, in addition to secure cycle facilities
- Tactile indicators provided as required by the relevant Australian Standard.

Pedestrian Footpaths

Principles

- Footpaths to provide comfortable, direct and safe pedestrian access to the station entry
- Footpath widths, lighting and trees shall reflect path hierarchy and accommodate the anticipated volume of users.

Initiatives

- Straight footpaths to enhance visibility and extended sight lines are provided where possible
- Path widths reflect hierarchy of stations and level of usage
- Formal tree avenues signify primary access paths
- Shade trees enhance user comfort
- Level of lighting reflects path hierarchy and provides safety and surveillance for night time use
- Seating located at key junctions and nodes along path lengths.

Modal Integration

Principles

- Provide priority access to pedestrian and cycle connections
- Deliver efficient, safe and convenient bus to rail access
- Locate Kiss and Ride facilities within close proximity of the station entries
- Provide adequate facilities for all users in accordance with disability standards.

Initiatives

- Proximity of drop-off and pick-up locations in accordance with Transport for NSW hierarchy
- Accessibility requirements integrated into design of all transport modes
- Bus, taxi and Kiss and Ride bays arranged so as not to impede traffic flows.

Buses

Principles

- To create efficient bus to rail interchange with direct legible and safe connections.

Initiatives

- Bus stops indented and integrated into footpath design
- Bus bays located close proximity to station plaza that provides customers with priority access.

Taxi and Kiss and Ride

Principles

- Provide clearly designated and easily accessible locations for set down and pick up of commuters.

Initiatives

- Taxi and kiss and ride shall be indented and integrated into footpath design
- Priority given to separate, designated taxi and kiss and ride facilities.

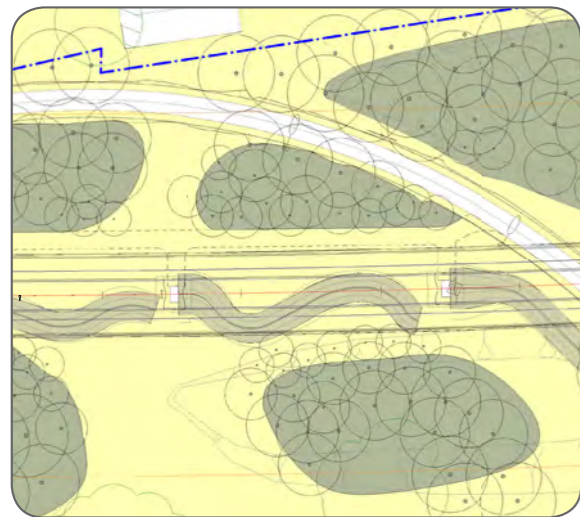


Figure 4.4_Pedestrian and Cyclist Linkages through the Skytrain Corridor. Source: HASSELL

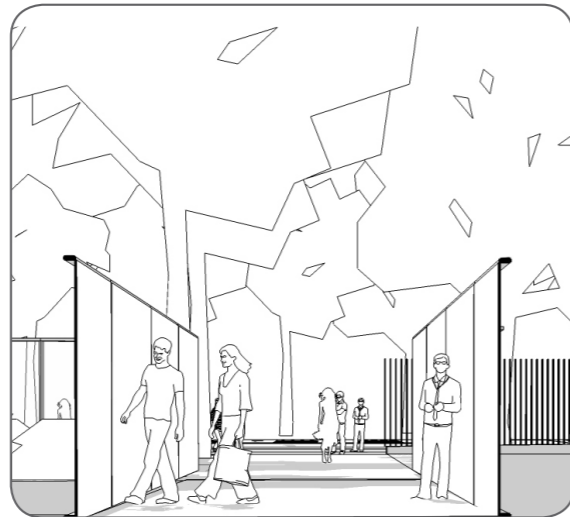


Figure 4.5_Pedestrian Bridge. Source: HASSELL



Figure 4.6_Wayfinding. Source: Wayfinding Strategy 2015



Figure 4.7_Bus Shelter. Source: Vert

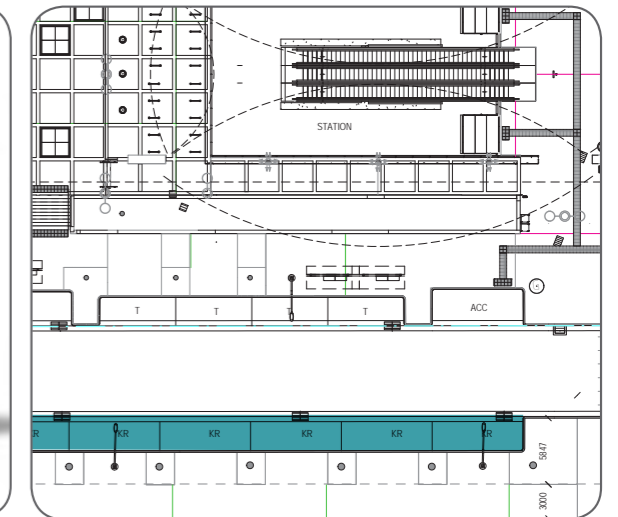


Figure 4.8_Kiss and Ride. Source: HASSELL

Car Parking

Principles

- _ Parking facilities are easily accessible, safe and with clear connection to the station building
- _ The parking facility does not dominate the station entrance or immediate surroundings.

Initiatives

- _ Pedestrian spines orientated to efficiently direct users toward the station entry
- _ Design enhances passive surveillance into car parks from surrounding areas
- _ Vegetation predominantly consists of low understorey planting and shade trees to ensure clear sight lines at eye level
- _ All trees clear trunked to meet CCTV and CPTED requirements.

Commercial Opportunities

Principles

- _ Where possible and appropriate make provision for potential future retail and associated amenity within and around the station plaza.

Initiatives

- _ Efficient movement of transport customers through the station and precinct is delivered
- _ Potential retail seating or browsing zones do not interfere with customer operations
- _ Potential commercial opportunities sited in locations that provide activation and passive surveillance.

Environmental Responsiveness

Principles

- _ Protect adjacent waterways from pollutant run-off
- _ Re-establish native vegetation to disturbed areas
- _ Minimise infrastructure footprint in areas of environmental sensitivity.

Initiatives

- _ Native trees that create shade used in car parks
- _ WSUD devices in the car parks
- _ Water treatment initiatives are apparent to promote community awareness
- _ Species selection reflects the character of planting in adjacent natural and cultural landscape settings.

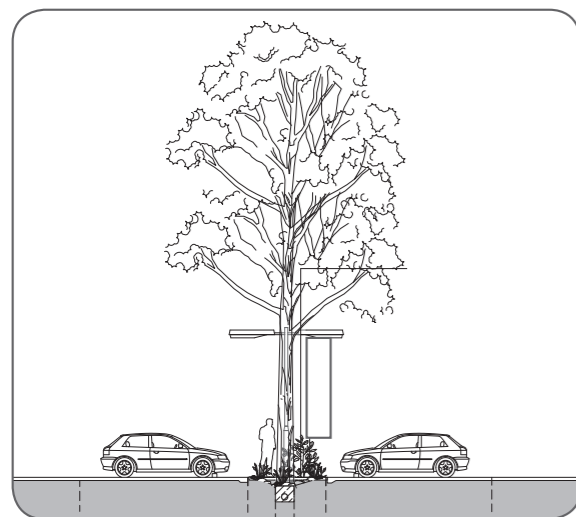


Figure 4.9_Car Parking. Source: HASSELL

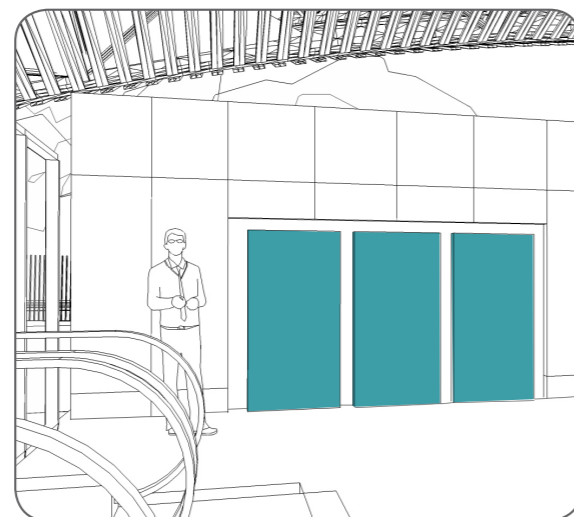


Figure 4.10_Vending Machines at Station Precincts. Source: HASSELL



Figure 4.11_Planting in the Corridor. Source: HASSELL

4.3 Landscaping Measures to Minimise, Mitigate and/or Offset the Impacts of the SSI

The landscape design for Sydney Metro Northwest has been developed to satisfy diversity of cultural, environmental and functional objectives and to achieve the strategies documented in Section 2 of this UDCLP. The guiding principles upon which the design is based and the key initiatives incorporated into the landscape design are summarised in this section. Descriptions of how they have been applied at the individual corridor/precinct level are contained in Section 3 of this UDCLP.

4.3.1 Response to Context

Principles

- Respond to the regional and local landscape types so that the Sydney Metro Northwest is firmly anchored in its landscape character for the benefits this brings to the rail patrons, local community and ecology.
- Respond to the character of the Cumberland Plain landscape types.

Initiatives

- Retain significant existing vegetation to maintain the local landscape character and mitigate potential visual impacts
- Use the local naturally occurring vegetation assemblages as a basis for selection of plant species to be used in planting works along the corridor.
- Use plant species that have local cultural resonance within the station curtilages to provide a link with local history and a special identity for the location.

4.3.2 Visual Quality

Principles

- Maintain components of the existing settings that contribute positively to the scenic experience of landscape
- Identify and mitigate poor quality views that detract from the scenic experience of the landscape.

Initiatives

- Use strategically placed planting to enhance vistas and views to quality scenic elements within and outside the corridor
- Screen undesirable views to or from undesirable visual elements within and outside the corridor
- Immerse the rail user in the landscape along the length of the corridor.



Figure 4.15_Visual Quality: Immerse the user in the landscape along the length of the corridor. Source: HASSELL



Figure 4.16_Visual Quality: Create filtered views and vistas from the train through the landscape. Source: HASSELL



Figure 4.17_Visual Quality: Ensure screening of the viaduct from existing properties. Source: HASSELL

4.3.3 Ecology and Biodiversity

Principles

- _ Wherever possible, protect and retain existing viable natural systems along the rail corridor including vegetation communities and habitats
- _ Use the naturally occurring species as a basis for plant selection to augment the ecological values of the local area
- _ Generally confine the use of the exotic species to the station precincts or the curtilage of culturally significant sites.

Initiatives

- _ Soil management strategy to effectively protect and guide the reuse of soils and their amelioration to contribute to the biodiversity of the location
- _ Water Sensitive Urban Design (WSUD) initiatives are incorporated into the design of the corridor and station precincts to conserve water resources
- _ Planting design appropriate to the landscape character of the area.

4.3.4 Cultural Heritage

Principles

- _ Respect the cultural heritage values of the corridor and its environs and seek to enhance these by appropriate landscape treatments and interpretations which tell the story of the place.

Initiatives

- _ Planting schemes respond to the narrative of the Public Art Plan to identify and celebrate the values of the location
- _ Appropriate planting located to screen and or enhance views to/from sites of cultural heritage such as Mungerie House and White Hart Inn consistent with the requirements of the relevant heritage study.

4.3.5 Function and User Comfort

Principles

- _ Respond to the functional requirements of the operation and use of the rail line through appropriate placement of vegetation and the selection of suitable species
- _ Provide for the comfort of users by designing planting that responds to seasonal differences.

Initiatives

- _ Planting design is based on a hierarchy that favours the use of endemic vegetation through the broader landscape areas of the rail corridor and amenity planting to provide shade and colour highlights around the station curtilages to respond to seasonal change for the enjoyment and comfort of users
- _ Selection and siting of planting provides passive and subconscious direction of users towards destination points
- _ Street and at grade car parking trees provide shade during summer.

4.3.6 Safety and Security

Principles

- _ Landscape treatment to be designed to enhance community and rail patron safety and security.

Initiatives

- _ Planting designed to maintain clear sightlines at road and rail intersections offset from rail infrastructure elements in accordance with potential tree height fall distance guidelines
- _ Planting structures and densities provide clear sightlines across planting areas in accordance with Crime Prevention Through Environmental Design (CPTED) guidelines
- _ Massed planting beds in lieu of grassing in steep areas

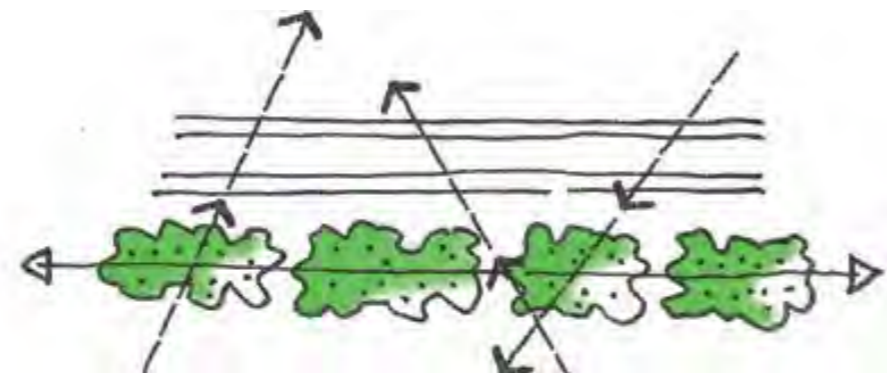


Figure 4.18_Ecology and Biodiversity: Connect existing pockets of vegetation to create and enhance ecological links along the existing creeks and across the corridor which will form the backbones of the linear parkland along the corridor. Source: HASSELL

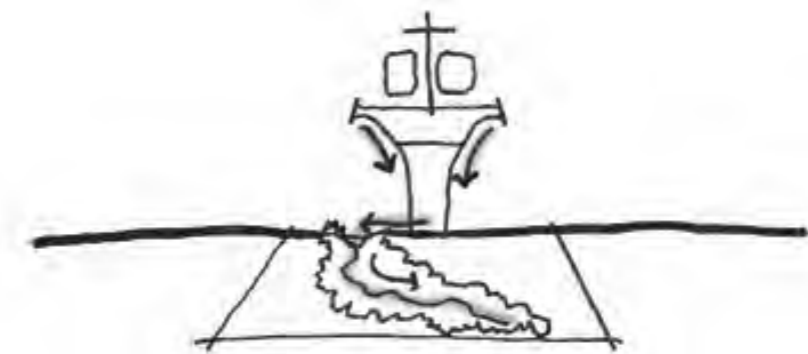


Figure 4.19_Ecology and Biodiversity: Allow for stormwater capture and reuse. Source: HASSELL

4.3.7 Planting Design

The planting design concept, together with the selection of plant species to be used within the corridor and precincts constructed landscapes, is based on:

- the prevailing natural and cultural environmental conditions of the North West Sydney area
- the design role and function the plants need to play for the project
- species guidance contained in EIS 2 and TfNSW’s report North West Rail Link Design Guidelines Part 3 Urban and Public Domain augmented by detailed investigations undertaken by the design team, its horticultural consultant and other specialist studies

Planting design reflects the line wide systems approach where precinct character is informed by local settings, regional context, the Hills and Plain local context, understanding local variances, station identity, local address and identity.

This is reflected with selection of tree, shrub and ground cover species in relation to regional, local and station context.

Planting characters are proposed across the precinct are described below.

Bushland Trees

The bushland planting will emulate the Cumberland Plain Woodland community and tie into the language of the bushland corridor.

Street Trees

Street trees emphasise the Cumberland Plain Woodland character of the precinct. A consistent canopy is achieved where possible for ample shading.

Plaza Trees

Trees within the plaza areas define the station entry areas and assist with orientation and location of the station access points from wider public domain. They provide shade and amenity to the entry, ensuring all sight lines are maintained.



Figure 4.20_Artist Impression of Plaza Planting Design at Bella Vista Station Source: Ai3D

Planting Palette

Locally native species dominate the planting selection lists. The bushland character will unify the corridor both visually and ecologically trees. This native plant palette forms a backdrop setting as part of the line wide natural systems approach.

The line wide planting palette is listed below.

Trees			
<i>Acacia binervata</i>	Two-veined Hickory	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Acacia decurrens</i>	Black Wattle	<i>Eucalyptus haemastoma</i>	Scribbly Gum
<i>Acacia implexa</i>	Hickory Wattle	<i>Eucalyptus microcorys</i>	Tallowwood
<i>Acacia floribunda</i>	White Sally	<i>Eucalyptus moluccana</i>	Grey Box
<i>Acacia longifolia</i>	Sydney Wattle	<i>Eucalyptus parramattensis</i>	Drooping Red Gum
<i>Acacia parramattensis</i>	Parramatta Wattle	<i>Eucalyptus pilularis</i>	Blackbutt
<i>Acacia terminalis</i>	Sunshine Wattle	<i>Eucalyptus punctata</i>	Grey Gum
<i>Allocasuarina torulosa</i>	Forest Oak	<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Angophora bakeri</i>	Narrow-Leaved Apple	<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Angophora costata</i>	Smooth-Barked Apple	<i>Fraxinus griffithii</i>	Himalayan Ash
<i>Angophora floribunda</i>	Rough Barked Apple	<i>Lophostemon confertus</i>	Queensland Brush Box
<i>Araucaria cunninghamii</i>	Hoop Pine	<i>Leptospermum polygalifolium</i>	Yellow Tea Tree
<i>Backhousia myrtifolia</i>	Grey Myrtle	<i>Liquidambar styraciflua</i>	American Sweetgum
<i>Banksia spinulosa var. spinulosa</i>	Hair Pin Banksia	<i>Melaleuca styphelioides</i>	Paper Bark
<i>Brachychiton acerifolius</i>	Illawarra Flame Tree	<i>Melaleuca decora</i>	White Feather Honey Myrtle
<i>Cassuarina glauca</i>	Swamp oak	<i>Murraya paniculata</i>	Orange Jasmine
<i>Casuarina cunninghamiana subsp. cunninghamiana</i>	River Oak	<i>Pistacia chinensis</i>	Chinese Pistacio
<i>Callistemon salignus</i>	White Bottlebrush	<i>Pittosporum tobira</i>	Japanese Mock-orange
<i>Ceratopetalum gummiiferum</i>	NSW Christmas Bush	<i>Platanus x acerifolia</i>	London Plane Tree
<i>Corymbia gummiifera</i>	Red Bloodwood	<i>Prunus cerasifera 'Nigra'</i>	Purple Leaf Cherry Plum
<i>Corymbia maculata</i>	Spotted Gum	<i>Prunus x blireana</i>	Cherry
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	<i>Pyrus calleryana</i>	Callery Pear
<i>Eucalyptus amplifolia</i>	Cabbage Gum	<i>Sapium sebiferum</i>	Chinese Tallow
<i>Eucalyptus baueriana</i>	Blue Box	<i>Syncarpia glomulifera</i>	Turpentine
		<i>Tristaniopsis laurina</i>	Water Gum
		<i>Tristaniopsis laurina 'Luscious'</i>	Water Gum 'Luscious'



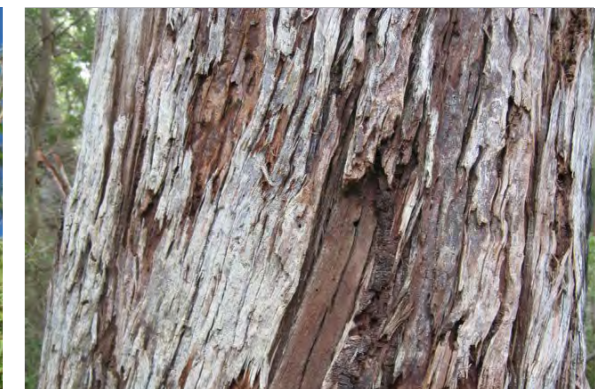
1_ *Angophora costata*



2_ *Angophora floribunda*



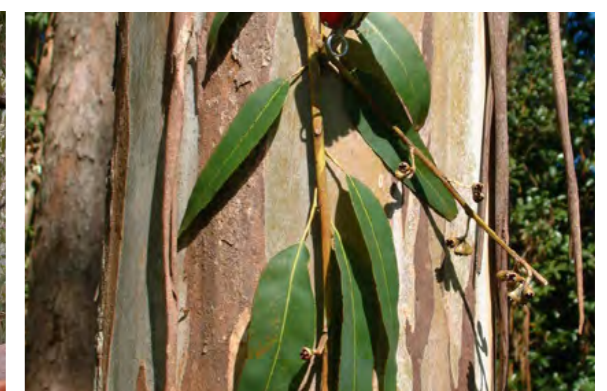
3_ *Corymbia maculata*



4_ *Eucalyptus pilularis*



5_ *Eucalyptus punctata*



6_ *Eucalyptus saligna*

Grasses

<i>Alisma plantago-aquatica</i>	Water Plantain
<i>Aristida ramosa</i>	Purple Wiregrass
<i>Austrodanthonia richardsonii</i>	Wallaby Grass
<i>Baumea articulata</i>	Jointed Club Rush
<i>Baumea rubiginosa</i>	Soft Twig Rush
<i>Bolboschoenus caldwelii</i>	Sea Club Rush
<i>Carex appressa</i>	Tall Sedge
<i>Cymbopogon refractus</i>	Barbed Wire Grass
<i>Dianella caerulea</i>	Blue Flax Lily
<i>Dianella longifolia</i>	Blue Flax Lily
<i>Dianella revoluta</i> 'Little Rev'	Dianella Little Rev
<i>Dichelachne micrantha</i>	Short Hair Plumegrass
<i>Dietes bicolor</i>	Yellow Peacock Flower
<i>Dillwynia sieberi</i>	Prickly Parrot Pea
<i>Echinochloa esculenta</i>	Japanese Millet
<i>Echinopogon ovatus</i>	Hedgehog Grass
<i>Eleocharis acuta</i>	Common Spike Rush
<i>Eragrostis brownii</i>	Love Grass
<i>Fimbristylis nodosa</i>	Knobby Club Rush
<i>Gazania (ORANGE)</i>	Gazania
<i>Gazania (PINK)</i>	Gazania
<i>Juncus kraussii</i>	Sea Rush
<i>Juncus usitatus</i>	Tussock Grass
<i>Lolium ssp.</i>	Eckiose Ryegrass
<i>Lomandra hystrix</i>	Green Mat Rush
<i>Lomandra katrinus</i>	Katrinus Mat Rush
<i>Lomandra longifolia</i>	Spiny Head Matt Rush
<i>Lomandra verday</i>	White Correa
<i>Microlaena stipoides</i>	Weeping Grass
<i>Microlaena stipoides</i> 'Griffin'	Weeping Grass
<i>Pennisetum alopecuroides</i>	Swamp Foxtail
<i>Poa labillardieri</i>	Tussock Grass
<i>Secale cereale</i>	Rye Corn
<i>Shoenoplectus validus</i>	River Club Rush
<i>Themeda australis</i>	Kangaroo Grass
<i>Themeda triandra</i> 'Tangara'	Kangaroo Grass



1_ *Dianella caerulea*



2_ *Dianella revoluta* 'Little Rev'



3_ *Lomandra longifolia*



4_ *Fimbristylis nodosa*



5_ *Shoenoplectus validus*



6_ *Themeda australis*



7_ *Echinopogon ovatus*



8_ *Juncus usitatus*

Shrubs

<i>Acacia decurrens</i>	Sickle Wattle
<i>Acacia falcata</i>	Sickle Wattle
<i>Acacia implexa</i>	Hickory
<i>Acacia terminalis</i>	Sunshine Wattle
<i>Acmena smithii</i> var. <i>Minor</i>	Dwarf Lili Pily
<i>Baeckea virgata</i>	Drum Stick
<i>Banksia spinulosa</i>	Hair Pin Banksia
<i>Banksia spinulosa</i> 'Birthday candles'	Birthday Candles
<i>Bursaria spinosa</i>	Black Thorn
<i>Callistemon citrinus</i> 'White Anzac'	White Anzac
<i>Dodonaea viscosa</i>	Narrow leaf Hop Bush
<i>Goodenia hederacea</i>	Voilet leaved Goodenia
<i>Grevillea juniperina</i> 'Molonglo'	Grevillea Molonglo
<i>Grevillea obtusifolia</i>	Obtuse leaved Grevillea
<i>Helichrysum petiolare</i>	Liquorice Plant
<i>Hibertia scandens</i>	Snake Vine
<i>Hypericum calycinum</i>	St. Johns Wort
<i>Indigofera australis</i>	Native Indigo
<i>Kennedia rubicunda</i>	Dusky Coral Pea
<i>Kunzea ambigua</i>	White Kunzea
<i>Melaleuca decora</i>	White Feather Honeymyrtle
<i>Melaleuca thymifolia</i> 'White Lace'	Thyme Honey Myrtle
<i>Pittosporum tobira</i> 'Miss Muffet'	Miss Muffet Pittosporum
<i>Trachelospermum jasminoides</i>	Star Jasmine
<i>Trifolium pratense</i>	Red Clover
<i>Vinca minor</i>	Periwinkle
<i>Westringia</i> 'Wynyabie Gem'	Wynyabie Gem



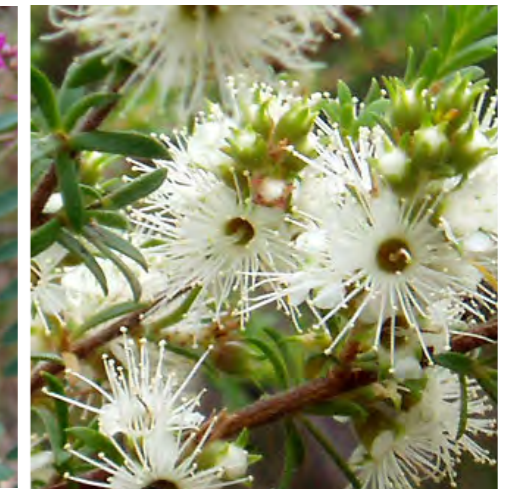
1_ *Callistemon citrinus* 'White Anzac'



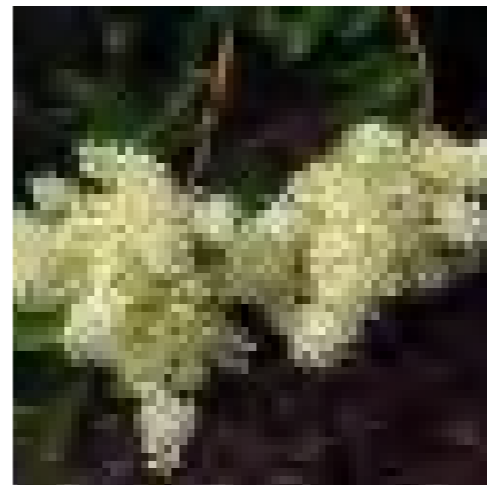
2_ *Acacia falcata*



3_ *Indigofera australis*



4_ *Kunzea ambigua*



5_ *Bursaria spinosa*



6_ *Acacia implexa*



7_ *Melaleuca decora*



8_ *Westringia* 'Wynyabie Gem'

Planting Response to Public Art Program

While line wide planting mixes primarily respond to the regional and local landscape settings and their associated requirements, this planting palette is supplemented at each precinct to highlight the individual station identities. This is in line with the Public Art themes as described in the *'Light Line Social Square'* strategy.

Figure 4.21 illustrates the relationship between the station colour and selected highlight plant species for the eight stations. Figure 4.22 illustrates the flowering period of the public art planting at each station.


	Native Tree	Plaza Tree	Terrace Tree	Understorey
CHE	 Angophora floribunda	 Prunus cerasifera 'Nigra'	 Prunus x blireana	 Gazania sp.
CSH	 Eucalyptus crebra	 Brachychiton acerifolius		 Kennedia rubicunda
SHW	 Eucalyptus crebra	 Sapium sebiferum		 Gazania sp.
NRW	 Eucalyptus crebra	 Pistacia chinensis		 Grevillea juniperina 'Molonglo'
BLV	 Eucalyptus moluccana	 Pyrus calleryana	 Xylosma senticosum	 Hibertia scandens
KVE	 Eucalyptus moluccana	 Tristaniopsis laurina		 Hypericum calycinum
RSH	 Lophostemon confertus	 Tristaniopsis laurina 'Luscious'		 Pittosporum tobira 'Miss Muffet'
CUD	 Eucalyptus crebra	 Fraxinus griffithii	 Murraya paniculata	 Vinca minor 'Alba'

Figure 4.21_Plant selection in line with regional / local and station identity. Source: HASSELL

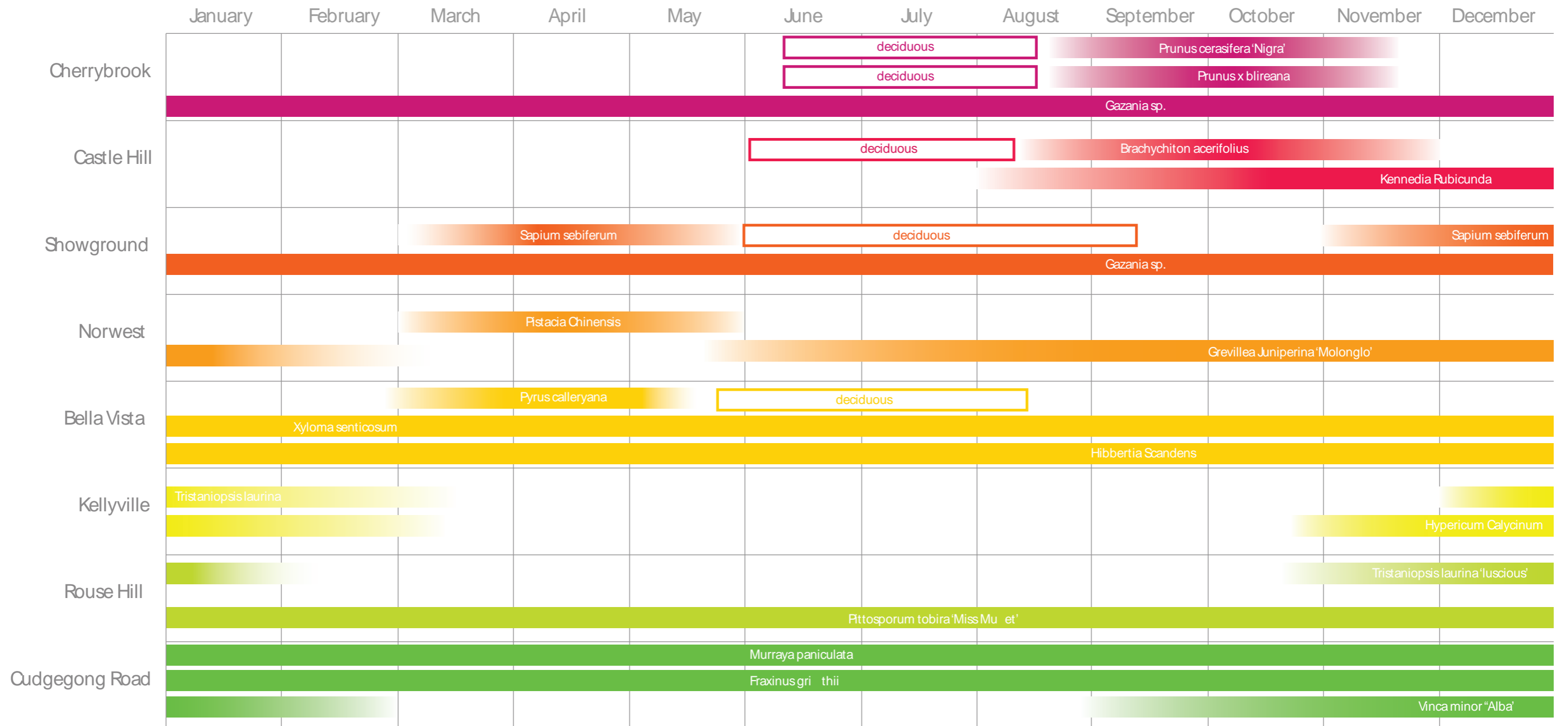


Figure 4.22_Plant selection in accordance to Public Art Plan. Source: MWA with T+C Studio.

4.3.8 Landscape Maintenance Summary

The landscape works have been designed to optimise long-term maintenance both in terms of operations and costs. Plant species have been selected to be low maintenance and drought tolerant. Irrigation is provided on a temporary basis, principally to ensure that plants are established well during the early years of growth, although it is expected that the trees will become independent of irrigation by the end of the first growing season.

Landscape maintenance will be continuous throughout the operating period. The operator will be responsible for maintaining the landscape softworks in their licensed maintenance area to a high standard of health and appearance.

The following horticultural practices shall be carried out to ensure plants are maintained in a vigorous condition.

Generally

- Watering - Generally ensure that all planting is receiving sufficient water to ensure vigorous growth and maintained in a healthy condition
- Weed and pest control - Eradicate all grass, weeds and pests from within planted areas with approved weedicides and insecticides and remove from site and use measures to prevent reinfestation
- Monitor all plants and trees for pest and disease on a monthly basis
- Fertilising as appropriate to the species
- Replacement of plants - Treat or replace damaged plants and replace unhealthy or stolen plants to ensure minimum planting densities are retained as required, including riparian zones

- Remulch as necessary throughout the Landscape Maintenance Period to maintain mulched areas to the specified depths
- Litter and debris - Ensure that the site is kept clean, free of all litter, and general debris at all times.

Turf and Seeding

- Mowing of turf and grassed lawns on a regular basis as required to maintain grass at a appropriate height for its use.
- Topdressing of grass seeded areas as required to maintain healthy grass surface and coverage
- Turf areas to be replaced where dead or dying, and establishment practices undertaken for a minimum of two weeks

Trees, Shrub, Ground Cover and Wetland Planting

- Pruning of vegetation for safety, with regard to operations of rail line, bushfire risk, safety of public domain and CPTED surveillance.
- Adjustment of tree ties, and timber edging and tree stakes.

Equipment/Features Maintenance

- Monitor all features within the public domain for damage. Repair all elements as soon as notified to minimise further deterioration and prevent harm or access where security is compromised



Figure 4.23_Artist Impression of Station Precinct Planting Design at Cherrybrook Station Source: Ai3D

4.4 Built Elements in the Landscape

The built elements of the project within the landscape of the Sydney Metro Northwest project will contribute to creating quality landscape settings and a quality experience for rail patrons and the community at large. To achieve this, the built elements must balance a contextually responsive approach with a consistent project-wide design that expresses the line wide identity and delivers value for money. The overarching principles and initiatives adopted in the design of the main built elements within the corridor landscape are summarised in this section. Details of built elements within the station precincts are contained in Section 4.12 of this UDCLP.

4.4.1 Earthworks and Embankments

Principles

Visually integrate earthworks into their adjacent landscape setting and minimise the extent of earthworks consistent with the requirements of maintenance and safety.

Initiatives

- Visually all earthworks sit lightly in their context, exhibiting a ‘natural fit’ within their landscape setting
- Use of retaining walls is preferred on batter slopes where gradients exceed 3H:1V. Planted batters are generally 4H:1V where possible
- Earthworks rounded out at both the top and bottom of batters and at each end of each formation, in order to achieve a ‘natural’ transition into adjacent landforms. Where these requirements cannot be met due to limited space, the use of retaining walls is preferred.

4.4.2 Noise Barriers

Principles

Visually integrate noise barriers into the rail corridor and urban or landscape setting, as part of a coordinated whole of corridor design.

Initiatives

- The height of noise walls are minimised consistent with the requirements of the noise and vibration mitigation recommendations.
- Follow linear alignments with long, even curvatures and run parallel with the rail track. The ground plane below noise walls is as even, as horizontal and as linear as possible.
- Rectilinear, modular wall panels used for consistency of appearance
- Ends of noise barriers terminated with a curved or raked wall section to integrate with adjacent structures or landform, or terminate by over lapping with adjacent structures in a planned and considered way
- Where steps within the length of noise walls are necessary due to unavoidable gradients, they present a consistent and legible rhythm in the design.
- Vertical post supports are not visible from the track side unless designed to create a specific rhythm effect when viewed from passing trains
- Noise barrier panels comprise robust, vandal resistant materials. Coating systems and applied colours readily available, easily and exactly matched throughout the life of the wall. Colours selected respond to rail restrictions and eliminate any conflicts with rail signalling (no reds or greens, for example).

- Joints, fixings and panels are carefully coordinated
- The apparent scale and visual impact of noise walls reduced with suitable planting
- A minimum 1.5m clearance provided from the outside of the noise barriers to any planting to enable inspection and maintenance access.

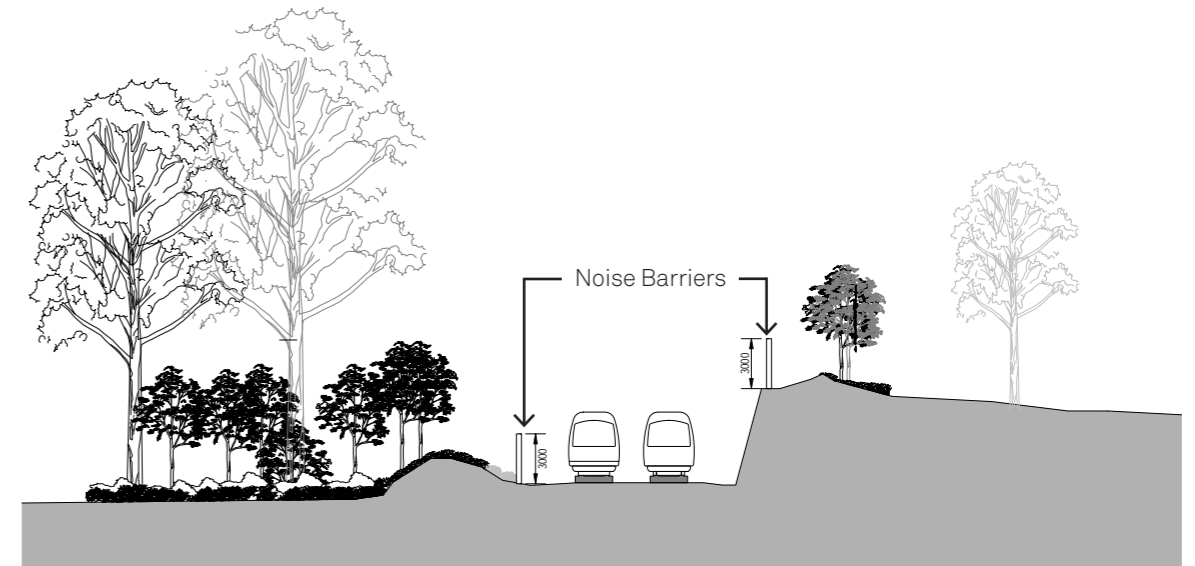


Figure 4.24_ Noise Barriers in the Rail Corridor. Source: HASSELL

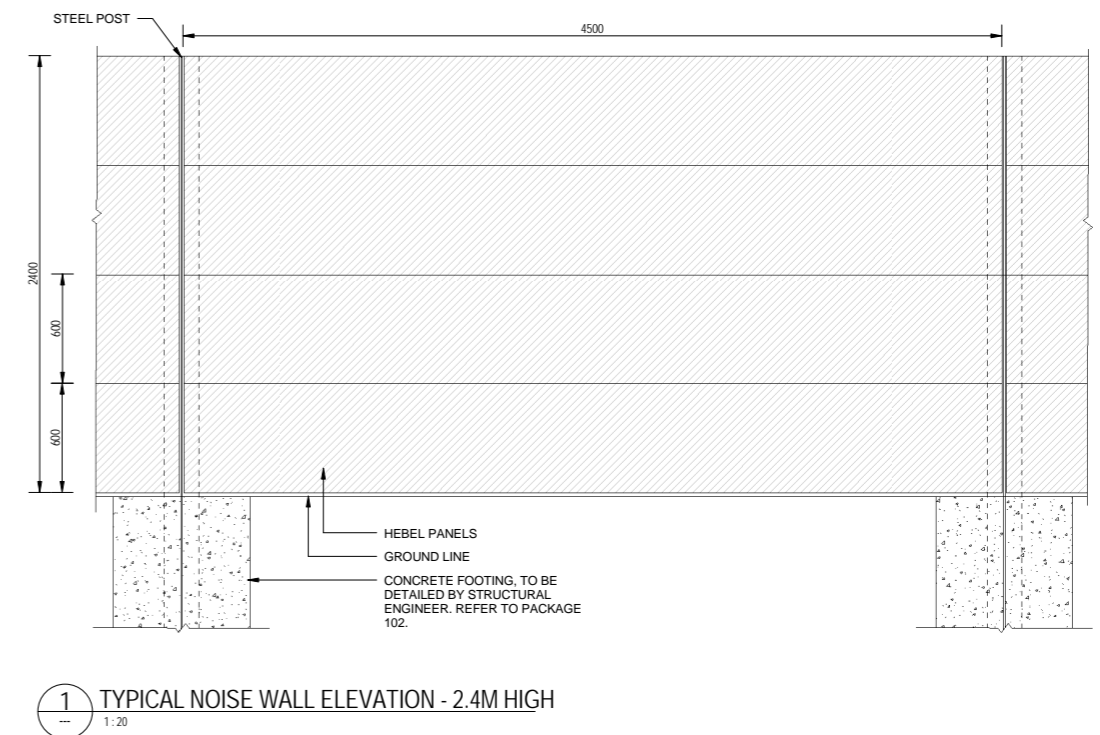


Figure 4.25_Typical Noise Wall Elevation. Source: HASSELL

4.4.3 Retaining Walls

Principles

Visually integrate retaining walls into the rail corridor and urban or landscape setting, as part of a coordinated whole of corridor design.

Initiatives

- These initiatives refer to retaining walls beyond station platforms. Retaining walls within stations are referred to in Section 4.12 of this UDCLP
- Retaining walls and related elements are designed as a unified composition and integrated with other components such as fencing, guard rails and noise walls
- Retaining walls are only used where there is no other alternative. Cut and fill batters of 3H:IV or flatter are vegetated
- For consistency retaining structures are coordinated with other structural elements, barriers, lighting landscape and drainage and noise walls and fencing
- In elevation walls incorporate a consistent, modular pattern of vertical and horizontal joints expressed as shadow lines throughout.
- Vertical joints are coordinated with the vertical joints or stanchions of related elements placed immediately above the walls
- Except where required to conform with the public art plan retaining wall finishes have a smooth, non-textured Class 2 concrete finish
- The use of shotcrete is confined to areas where there is no other acceptable retaining wall or vegetated embankment alternative. where unavoidable, it will be to mimic adjacent structures within the Sydney Metro Northwest.

- A consistent horizontal 'dado' or shadow reveal to be inscribed into the wet shotcrete.
- The surface finish is a consistent off-white or dark grey (according to the approved colour prototype) with no obvious patches or stains due to curing agents and the like.

4.4.4 Shared User Path and Associated Bridges

Principles

- Visually integrate shared user paths into their adjacent landscape setting

Initiatives

- Shared user paths comply with Austroads requirements for dedicated and shared bicycle paths and facility design.
- Bridges are designed for shared use by both pedestrians and cyclists.
- Bridge type is pre fabricated steel with the span length up to 32m, 3000mm standard clearance width, with fibre reinforced plastic (FRP) grate decking with a kick rail each side
- The path surface should be as close as possible to the lower side of the trusses (trusses should not extend far below path surface).

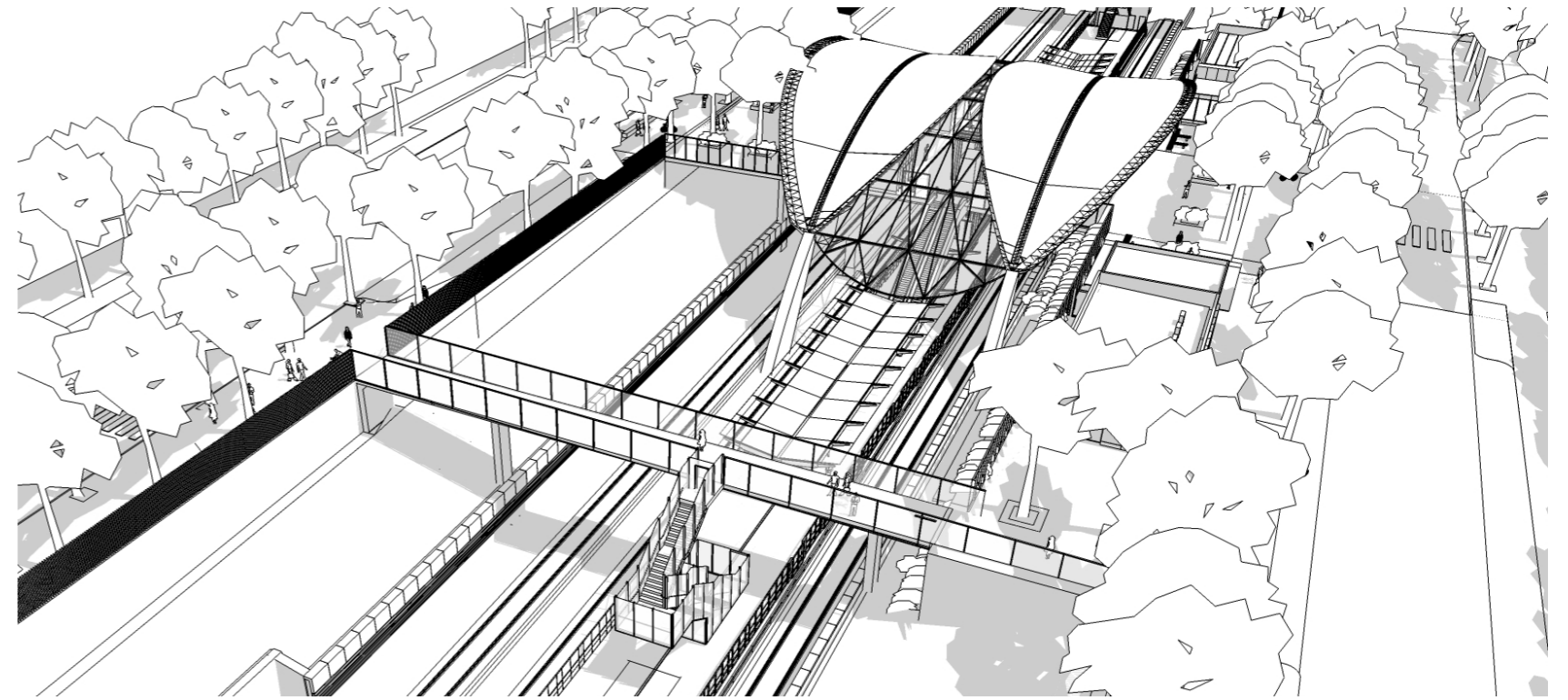


Figure 4.26_Impression of Pedestrian Bridge at Cudgegong Road Station. Source: HASSELL

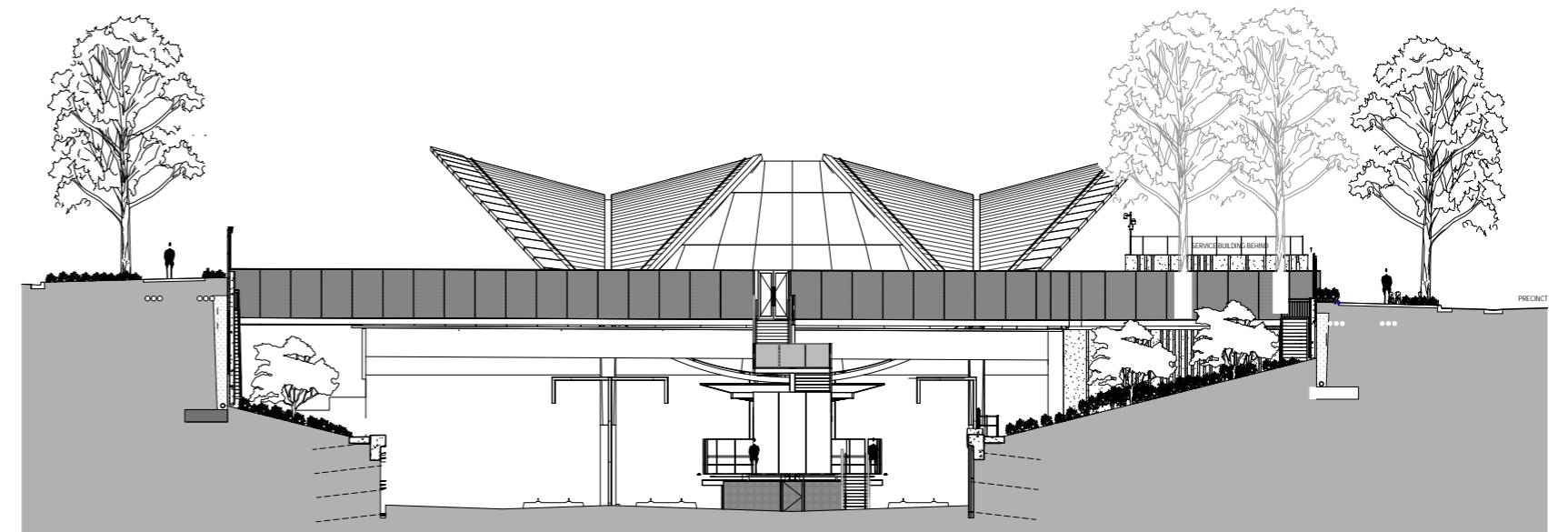


Figure 4.27_Section showing Pedestrian Bridge at Cudgegong Road Station. Source: HASSELL

4.4.5 Fencing

Principles

- Visually integrate fencing elements and safety screens into the rail corridor, precinct or landscape setting, as part of a coordinated whole of corridor design.

Initiatives

- Security fencing is set back from the street edge with a planting frontage where possible for a discrete boundary marking within the precinct public domain setting.
- Security fences along the corridor are part of an integrated design which includes the viaduct parapets, noise barriers, screens and other structural elements to form a continuous secure and safe rail corridor, preventing unauthorised access to the tracks.
- The corridor security fence is generally a 2.4m high black powder coated chain link fence.
- No perimeter fencing along the corridor boundaries is proposed to facilitate maintenance access and maximise visual amenity.

4.4.6 Furniture and Fixtures

Principles

- Furniture and fixtures should provide respite, safety, comfort, services and functionality to public spaces, as well as unclutteringly punctuating the public domain with items of interest.

Design Details

- Material expression – clear, honest expression of the materials used
- Natural materials – use of warm, natural materials such as timber
- Durability – use of highly durable, self-finished materials requiring minimum maintenance
- Consistency of expression – use of consistent elements to create a strong line-wide identity
- Relationship to Architecture - the landscape palette will read as a consistent language and have a relationship to the station architecture

Initiatives

- A suite of fixed seating accommodates individuals and groups in locations which are comfortable and appropriate for resting. These are mostly located within the primary and secondary plazas.
- Informal seating opportunities are provided throughout the precincts in the form of public art/sculptural urban elements.
- Street lighting and public space lighting are supplemented with amenity lighting. This is focused on elements within the primary and secondary plazas such as uplighting to trees and benches.

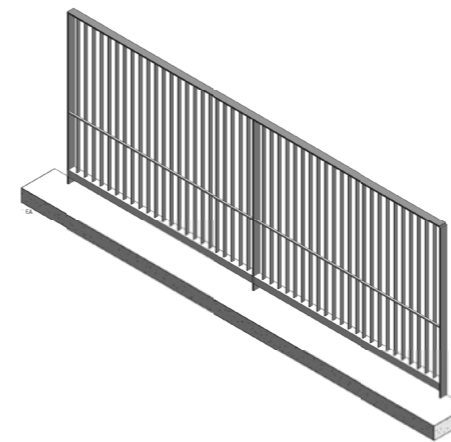


Figure 4.28_Palisade Fencing Design. Source: HASSELL



Figure 4.29_Bicycle Hoop Design. Source: Vert



Figure 4.30_Public Domain Bin Design. Source: Vert



Figure 4.31_Kiss and Ride Stand Design. Source: Vert



Figure 4.32_Bus Shelter Design. Source: Vert



Figure 4.33_Public Domain Seat Design. Source: Vert

4.4.7 Public Domain Pavements

Principles

- Ensure the safe, efficient movement of pedestrians, including people with disabilities, through high quality paving design.
- Assist with wayfinding through the public domain

Initiatives

- The paving composition will have a consistent approach system wide, using one colour with tonal variation, with subtle variations in tone and finish to emphasise the wayfinding and movement of people. This consistency of ground plane design will create a line wide identity and recognisable brand for the stations.
- A hierarchy of paving types appropriate to function and location are provided in the station precincts
- High quality concrete paving units surface the primary and secondary plazas. Paver unit size, paving pattern and layout detailing highlight the primary plaza from secondary plaza spaces.
- In situ concrete is used for footpaths across the remaining public domain areas.
- Safe and equitable pedestrian access throughout
- To optimise the legibility of precinct spaces, paving consists of simple, linear patterns that relate to the main direction of travel.

- Precinct pavement surfaces will be constructed for all weather usage with a minimum slip resistant finish in accordance with relevant Australian Standards and in consideration of local council requirements.
- Smooth transitions are provided between abutting paved surfaces, free of trips and hollows.
- Within main paths of travel, tree pits and tree grates are finished flush to adjacent paving.
- No trees, shrubs or street furniture are located within the main path of travel.

Wayfinding and Movement

The ease of movement and wayfinding of people through the Primary and Secondary Plazas is of high importance, and it is intended that the pavements within the plazas facilitate this.

The expected movement of people in and out of the stations is illustrated in the figure opposite. This includes zones of 'pause' at the sides of the gate line and lifts within the concourse.

In response to this the pattern, orientation, colour/tonal and finish of the pavers is intended to facilitate the movement and wayfinding through these spaces.

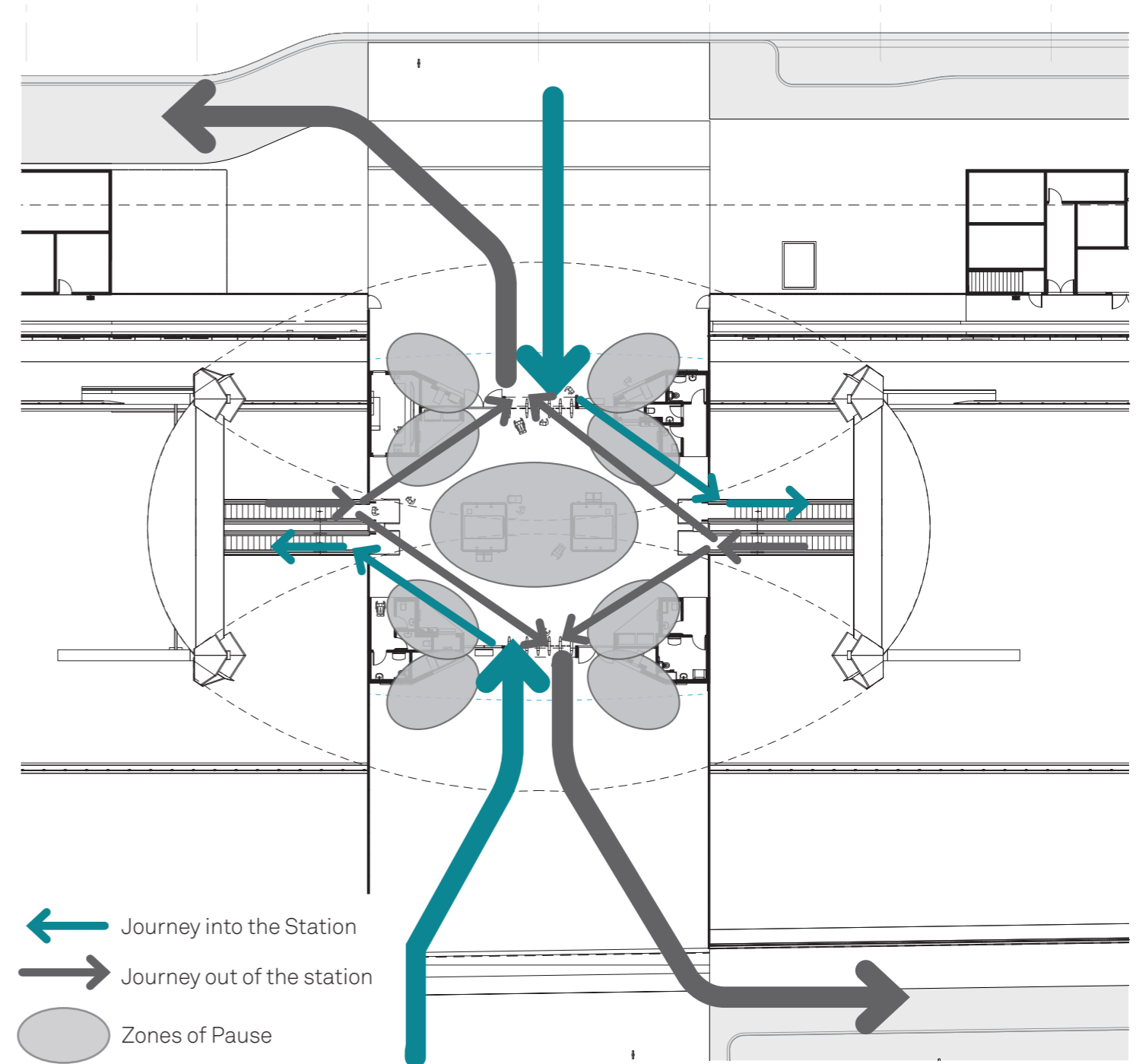


Figure 4.34_Primary Movement Paths and Zones of Pause. Source: HASSELL

Primary and Secondary Plazas

The Primary Plaza paving is intended to provide a threshold or ‘welcome mat’ to the station entrances. The paving typically starts at the street edge and continues through into the station concourse. This paving is intended to facilitate the movement and wayfinding of people through the station precincts.

The Secondary Plaza paving is intended to facilitate the movement of people through the footpaths and street edges.

The approach to paver size relates to the nature of the Primary and Secondary Plazas. Primary Plaza pavers are larger dimensioned, responding to the typically larger scale of these spaces with a mixture of large, medium and smaller size pavers within the Secondary Plazas, which respond to the smaller human scale spaces facing the street.

Streets and Pathways

The footpath pavements outside of the Primary and Secondary Plazas are a natural grey concrete, finished in a light broom finish perpendicular to direction of travel.

The colour of the concrete blends into the adjacent ‘mid grey’ tone of the Secondary Plaza paving, which transitions into the finish and tonal variation within the Primary Plazas.

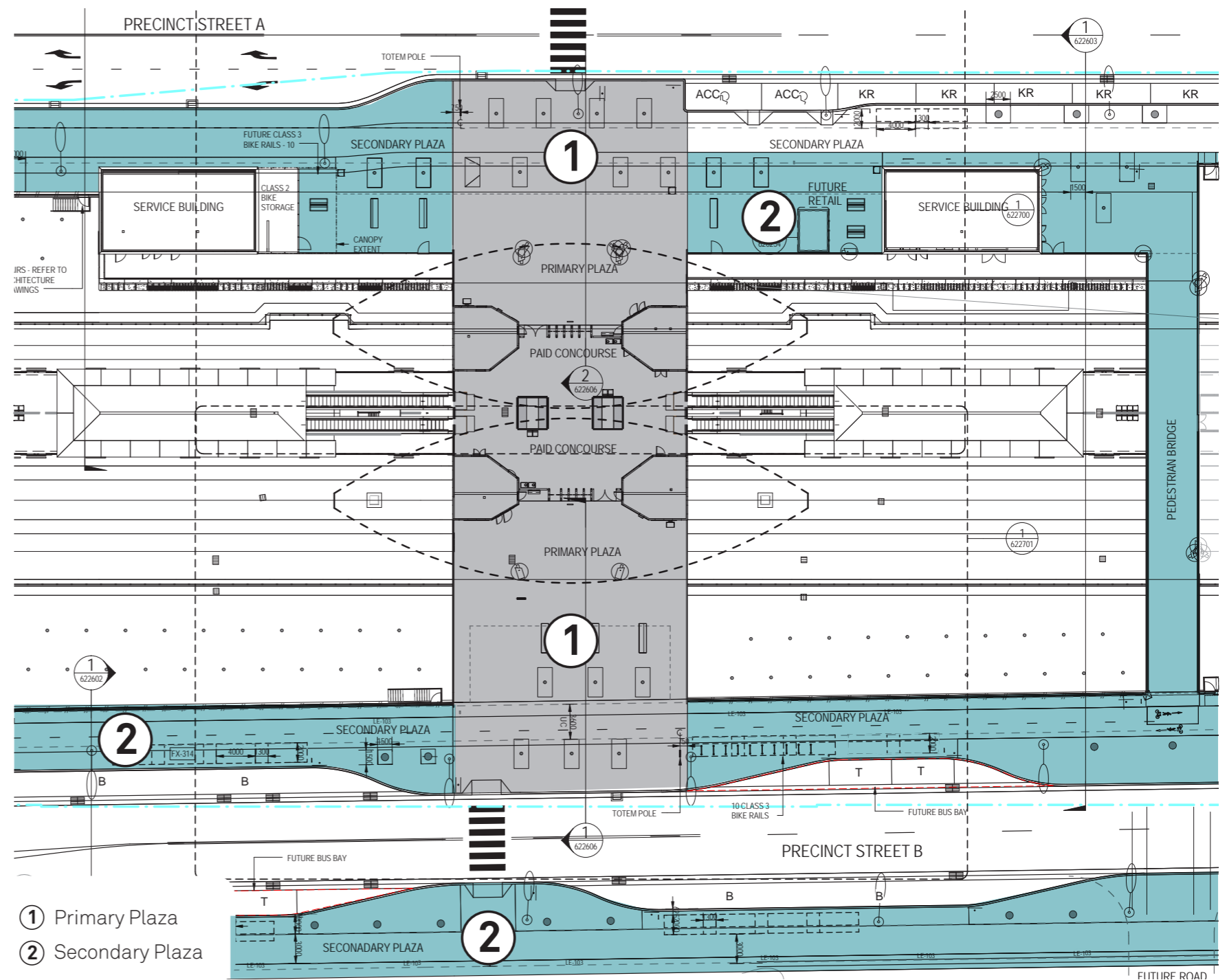


Figure 4.35_Paving in the Public Domain. Source: HASSELL

Tone and Finish

The body of the Primary Plaza paving is intended to provide a subtle variation in colour/tone, to further distinguish it from the Secondary Plazas and emphasise the direction towards the gate line. The selected colours (dark and mid grey) balance the effects of heat absorption and light glare.

The tone and finish of the pavers are intended to emphasise the areas of 'pause' and 'movement' through the plaza. This is achieved by using a contrasting tone and finish in these areas, using a feathered edge to subtly distinguish these areas from the body paving.

Tonal Variation

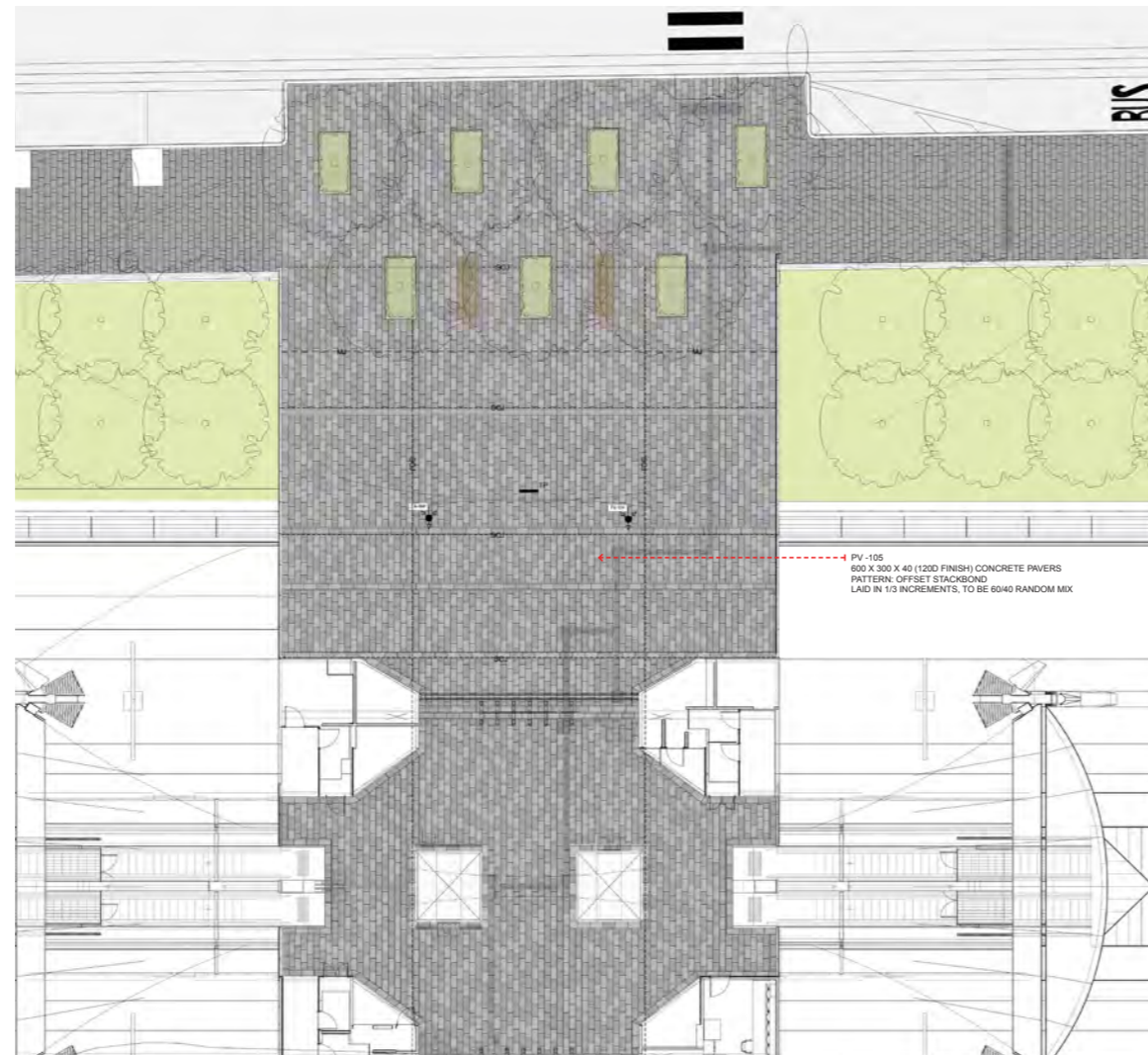


Figure 4.36_Primary Plazas- Subtle Tonal Variation in the Body Paving. Source: HASSELL.

Finish

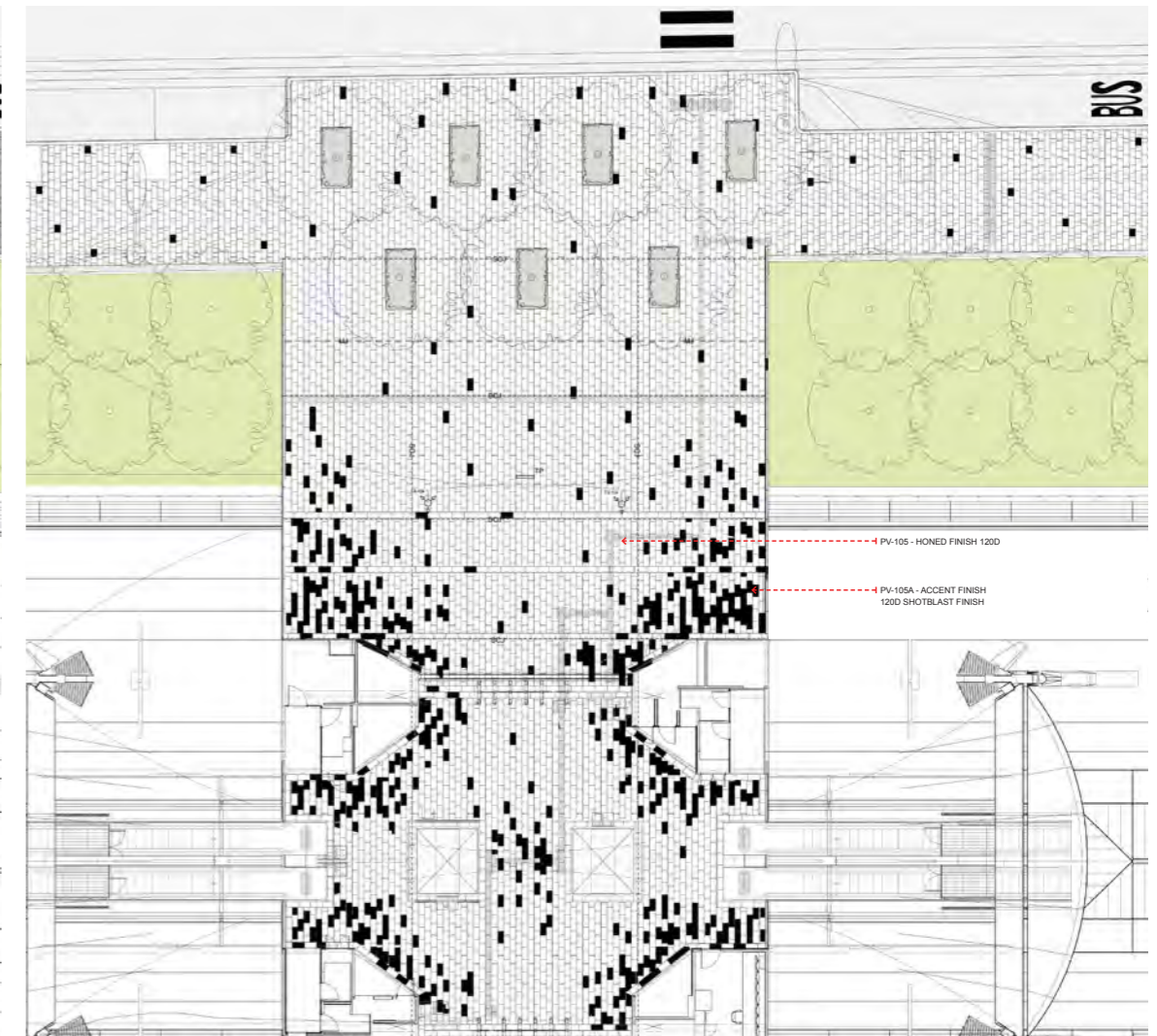


Figure 4.37_Primary Plazas- Contrasting Finish in Areas Adjacent to the Gateline. Source: HASSELL.

4.4.8 Public Domain Lighting

Principles

The following principles provide the framework for the lighting design strategy.

- Sustainability - Maintain a low energy usage
- Adaptability - One lighting fixture to be adaptable and utilised in different applications throughout the public domain.
- Comfort - Create a comfortable environment which enhances safety, the feeling of wellbeing and increases amenity within the space.
- Legibility - Lighting assists legibility of the spaces and materiality should be read in connection with suite of public domain elements and the station architecture.

Initiatives

- Lighting provides a clear visual hierarchy of light to support wayfinding and intuitive orientation
- Lighting located to ensure a visually comfortable and consistent experience for the user
- Lighting integrated with public art
- Discreet positioning to eliminate glare and avoid clutter
- Integral with wayfinding strategy
- Easy access for maintenance
- Minimise spill light levels and glare towards neighbouring properties
- Comfortable, glare free and safe lighting to comply with CPTED principles
- Consistent lighting design for each station typology and associated precinct
- Compliance with all station and precinct performance requirements including luminance levels adjusted for maintenance factors.



Figure 4.38_Artist Impression of lighting in the Public Domain at Norwest. Source: Ai3D.

4.5 Sustainable Design and Maintenance

4.5.1 Sustainable Design

For the Sydney Metro Northwest, sustainability means building public transport for current and future generations that optimises environmental and sustainability outcomes, transit service quality and cost effectiveness.

An environment and sustainability policy has been developed for the project. It acknowledges that the project has the potential for both positive and negative sustainability related impacts and aims to maximise the potential sustainability benefits while minimising negative impacts.

To do this, the policy establishes five areas of commitment:

- _ leadership
- _ community and customer
- _ land use integration and place making
- _ embedded sustainability
- _ accountability.

The commitments made under each area provide an overarching framework for the development of more specific sustainability objectives, as part of a sustainability strategy, to guide the integration of sustainability into project governance, design, construction and operation.

Strategies for sustainable design and implementation across the project include:

- _ station architecture: initiatives for building orientation, passive design, compact design, materials and finishes and furniture
- _ landscape and urban design initiatives relating to the provision of a shared cycle paths and associated cyclist facilities, ecology, plant selection and irrigation.

4.5.2 Sustainability Criteria

The Sydney Metro Northwest is targeting industry best practice in sustainable design. All stations, interchanges, car parks and maintenance facilities have been designed to achieve:

- _ 'Excellent' rating (Design and As Built) using the ISCA Infrastructure Sustainability (IS) rating tool v1.0
- _ 'Bronze' rating using the TfNSW Sustainable Design Guidelines v3.0.

The stations and precincts will incorporate a raft of embodied and operational resource saving initiatives including:

- _ Passive design to maximise use of daylight and natural ventilation, optimise thermal comfort and glare control
- _ Energy efficient building services equipment and control

- _ Reduction of embodied carbon such as, through the use of sustainable timber, low carbon steel or fly ash in concrete
- _ Rainwater harvesting to supply precinct irrigation
- _ Climate change risk mitigation strategies to prevent passenger thermal discomfort, flooding inundation and equipment failure
- _ Photovoltaic panels to contribute to the low voltage energy demand at each station.

The selection of energy efficient environmental control systems is important to achievement of sustainability objectives. The two main types to be used across the network are:

- _ mechanical ventilation and airconditioning
- _ natural ventilation.

4.5.3 Sustainability Initiatives

A natural systems approach has been adopted to ensure project wide sustainability initiatives have been integrated within the design of high quality sustainable station.

Precinct Features

Water catchment and reuse initiatives include:

- _ The employment of Water Sensitive Urban Design practices with a multi-tiered urban water cycle management strategy that seeks to retain as much storm water as possible to support plants, local ground water and integrated wetland features.
- _ Harvest and recycle water from station canopies for reuse during operations using a modular underground water storage tank
- _ Use of grass or vegetated swales to capture stormwater drainage.

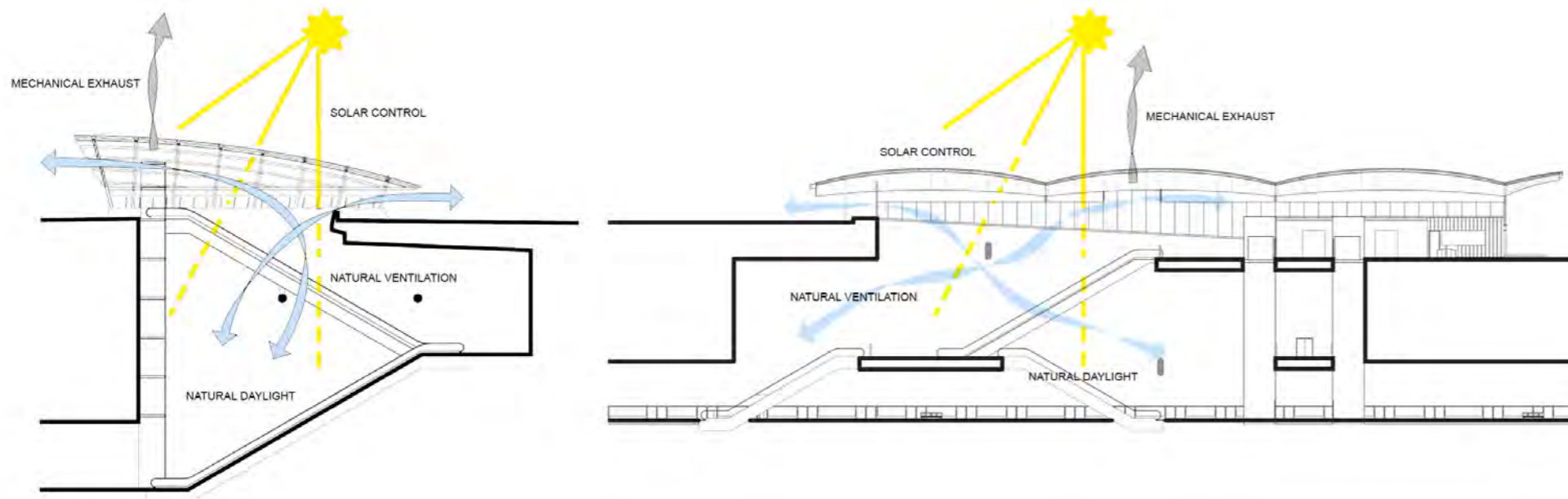


Figure 4.39_Station Ventilation Strategies. Source: HASSELL

- Pavements fall towards planting where possible to provide passive irrigation.
- The selection of drought tolerant plant species to minimise irrigation requirements.
- The inclusion of planting areas to increase permeable surfaces where possible.
- A comprehensive landscape design that promotes biodiversity and enhanced habitat connectivity.
- Integration of shade throughout the station urban design through the use of both vegetation and structures.

Station Design Features

Sustainability initiatives in the Station design include:

- A lightweight fly roof that provides shade and shelter to the station whilst delivering material efficiency and helping minimise the solar loads on the functional pods located beneath it.
- An integrated daylight design that permits natural light to penetrate deep into the space providing a more vibrant, active and changing space.
- An adaptive design that can respond effectively to usage and climate requirements to optimise energy consumption.
- A layered passenger experience focussed design that enables passengers to be protected from station noise prior to their arrival onto the platforms.

- A comprehensive response to both current heat island issues and future potential climate change impacts including a light coloured solar reflective roof to the station and a comprehensive station landscaping plan providing a planted shade canopy to the facility.
- A line wide renewable sources strategy is proposed which centralises photovoltaic cells on the roof of the primary maintenance building at the Rapid Transit Rail Facility headquarters

Material selection will follow sustainable principles including:

- High quality, durable and easily maintained and replaceable materials.
- Life cycle assessment to understand whole of life environmental impacts for material selection.
- Design for disassembly
- Precast elements including concrete panels.
- Timber to be FSC certified, recycled or reused.
- PVC and vinyl shall be part of the “Vinyl Council of Australia Product Stewardship Program”.
- Materials thermal durability shall include a minimum warrantied ambient temperature of no less than 55C.
- Manufacturers are required to disclose each product’s recycled content and the recyclability of the product prior to selection.

- All materials and furnishings shall demonstrate compliance with the applicable product Green Labelling of the product.
- Composite wood products are zero or low emissions (E1 or better, refer to Green Star)
- Comply with Green Star VOC targets table (paints, carpets, finishes, sealants and adhesives)
- All products and their manufacture must have zero ozone depletion potential
- Minimum 30% replacement of Portland cement content project wide.
- Recycled water content of 50% in concrete mixes
- Recycled aggregate content of at least 40% for coarse aggregates and 25% for fine aggregates.

Energy usage will be controlled and monitored including:

- Addressable lighting system, daylight sensors, occupancy sensor, timed switches and zoning
- Variable speed drives for fans/pumps, Building Maintenance Systems monitoring and control, zoning, switching and design for part load (while considering climate change projections)
- Electrical and water sub-metering linked to Building Maintenance Systems monitoring and control



Figure 4.40_Artist Impression of Norwest Station Concourse. Source: HASSELL

Mechanical Ventilation and Airconditioning

Of the three station typologies, it is the underground stations (cut and cover) that require the most mechanically assisted ventilation and cooling.

Underground stations will be served at platform level by spot cooling and ventilation to alleviate elevated summer temperatures and humidity. Public spaces are not heated at any Station.

Minimal reverse cycle air conditioning is provided at the following station back of house spaces:

- Station Managers Office
- Ticketing Offices
- Other specific staff and plant areas with high heat load areas.

Electrical substations are generally located at ground level with natural ventilation or mechanical exhaust with passive relief supply air.

Natural Ventilation

Natural ventilation principles and methods have been maximised in each of the station types. Those areas include:

- The upper levels of underground stations
- Open cut stations
- Elevated stations
- Multideck car parks.

At underground stations, the arrangement of perimeter glazed screens and roof canopies allow the wind to cross ventilate the concourse areas at high level drawing out warm air rising from the platform level below.

The multideck car parks are naturally ventilated. Cross ventilation is achieved by limiting facade screening to a maximum of 50% of the facade surface area.

4.5.4 Sustainable Maintenance

Approach

The approach to maintainability and whole of life design and operation is founded on the following key drivers and strategies:

- Complete design and documentation to ensure the fine resolution of detail and fabrication
- A ‘Kit of Parts’ solution to maximise quality, durability, repetition and consistency in detailing, materials and equipment
- Independent Design Review validation to ensure design quality and detail resolution
- Validation of detailing prior to construction
- Emphasis on prefabrication to ensure quality of finish, efficiency and economy
- Specification of high quality, robust and resilient materials, equipment, finishes and fittings selection to ensure long design life and low maintenance
- Secure supply chain and spares program to enable ready replacement where necessary with an equivalent and matching material, fitting or element.
- Reliability, Availability and Maintainability (RAM) analysis of key components

Key Maintainability Features

The key maintainability initiatives include:

- Station and precinct cleaning and maintenance proposals have been developed in conjunction with operations to ensure safe, practical methods are incorporated into the station designs.
- Materials and finishes have been selected and specified in order to minimise ongoing cleaning and maintenance costs. Anti-graffiti finishes are specified for all internal wall finishes. Unnecessary ledges, horizontal surfaces and recesses have been avoided to assist in the ease of cleaning.
- Consideration has been given to the means of access to all building and services elements requiring cleaning or maintenance.
- The stations have been designed around the use of a standard scissor lift for access to the majority of areas requiring cleaning or maintenance access. In high level voids a monorail abseiling track is provided allowing access for cleaning and maintenance.
- The principal electrical, communications and fire services routes are located in services bulkheads above platforms and at ceiling level where access is provided via accessible ceiling panels.
- Reliability, Availability and Maintainability (RAM) analysis will be undertaken on all elements during detailed design.
- 30° angle finishes on all potential bird roosting positions such as lift shafts and exposed steel structures have been provided to discourage birds.

Refer to Section 4.13 for further detail on the maintenance strategy for the station buildings.

Design Life Parameters

The materials, fittings and finishes have been chosen with the following design life parameters:

- Structural elements - 100 years
- Roof, ceiling and support structure - 50 years
- External cladding and glazing - 20 years
- Internal non-structural - fixtures and fittings - 20 years.

Strategy for Dealing with Graffiti and Vandalism

The principal means of minimising graffiti and vandalism is to consistently and vigorously apply CPTED principles.

These principles will drive responsible behaviours and will be augmented by Sydney Metro Northwest’s commitment to quality and the clear and responsive supervision of the public domain by trained, people friendly customer service staff.

In addition to these important CPTED initiatives:

- Ensure the cleanliness and appearance of all floors, walls and ceilings at all times
- Use anti-graffiti coatings or paint over strategy on vulnerable walls in public areas
- Install shatter proof glazing to vulnerable glazed screens, windows and barriers
- Provide vandal resistant materials, fittings and equipment
- Provide high quality illumination of public areas to deter loitering
- Provide full CCTV surveillance coverage of all public and amenity areas
- Promptly remove any graffiti, paint over or repair vandalism should it occur



4.6 Station Access Strategy (Condition C5)

Individual Station Access and Traffic Plan Reports have been prepared for each station and precinct of the Sydney Metro Northwest project. Refer Section 3.1.4 Parking, Pedestrian, Cyclist Access Arrangements and Facilities of this UDCLP for how these plans have been incorporated into the design of each station and precinct. In summary the plans integrate the access arrangements for all modes to provide integrated access arrangements that satisfy individual mode requirements and minimise potential conflicts between user groups.

The Station Access Plan Reports outline existing and future traffic requirements and related pedestrian movement for the precinct. These have been used as a guide to inform final precinct layouts and are coordinated with the precinct kerbside provisions for bus, taxi, kiss and ride and on-street parking.

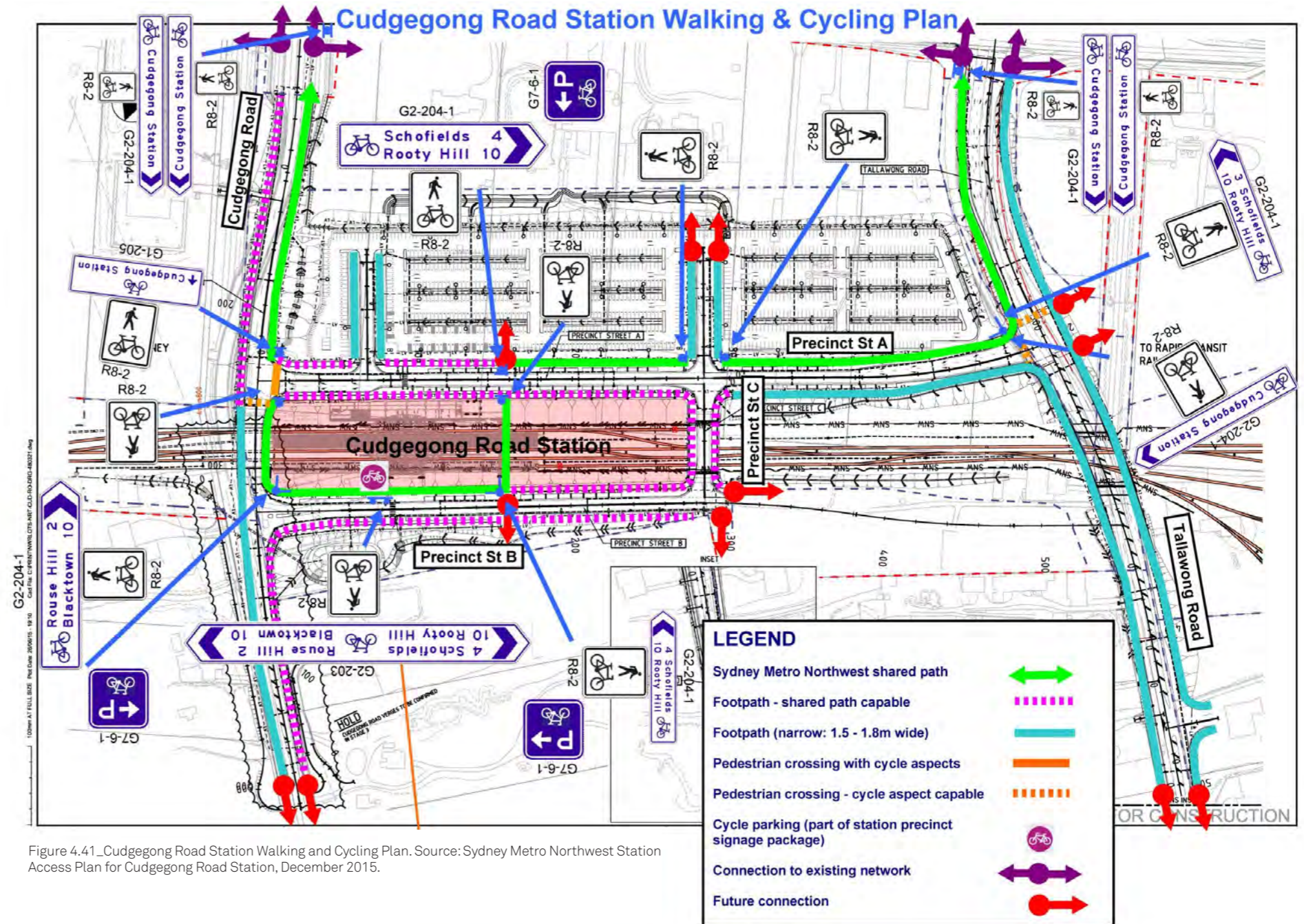


Figure 4.41_Cudgegong Road Station Walking and Cycling Plan. Source: Sydney Metro Northwest Station Access Plan for Cudgegong Road Station, December 2015.

4.7 Pedestrian and Cyclist Network Facilities Strategy (Condition C10)

Transport for NSW (TfNSW) aims to make NSW a better place to live, do business and visit, by managing and shaping the future of the whole transport system. One of TfNSW's objectives is to plan for a transport system that meets the needs and expectations of the public including encouraging sustainable transport modes that support alternatives to car use. Apart from the legibility, connectivity, and amenity of pedestrian and cycling physical infrastructure (footpaths and cycleways), non-infrastructure initiatives are also critical to consider such as encouraging public to consider walking and/or cycling or supporting people to start, end or link their transport activities by walking or cycling through awareness programs and workshops.

The Long Term Transport Master Plan (LTTMP) (TfNSW 2012) commits TfNSW to work to improve transport services through investment in new public transport, cycling and pedestrian infrastructure. Promoting sustainable travel to workplaces within North West Sydney and the provision of a network of accessible pedestrian and cycle paths to, from and through the eight new stations (Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville, Rouse Hill and Cudgegong Road) are part of the overall philosophy inherent in TfNSW's approach to delivering effective public transport in the area.

In accordance with Condition C10 of the Minister's approval for the Sydney Metro Northwest project, a pedestrian and cyclist network facilities strategy has been prepared. Refer Sydney Metro Northwest Pedestrian-Cycle Network and Facilities Strategy, June 2015.

The purpose of Sydney Metro Northwest Pedestrian-Cycle Network and Facilities Strategy (The Strategy) is to assist TfNSW and the Sydney Metro Northwest delivery office in delivering on the stated transport hierarchy for the project, prioritising pedestrians and cyclists in the transport planning for the new stations as illustrated in Figure 4.43. The strategy sought to ensure appropriate planning from the precincts and wider network surrounding the stations.

The scope of this strategy included consideration of the following:

- an examination of the existing and proposed local and regional pedestrian facilities and strategies
- existing and potential pedestrian and cycle access to and from the station locations
- consideration of the demand for pedestrian cycle facilities with the objective of encouraging increased pedestrian and cycle mode share
- the demand for pedestrian and cycle infrastructure and facilities at each station and access to from and through them
- safe secure and weather protected bicycle storage, as well as signs and wayfinding along the routes to and at each station, and the requirements of the relevant design standards.

The purpose of Pedestrian-Cycle network was to:

- assist TfNSW and NRT in delivering on the stated transport hierarchy for the project, prioritising pedestrians and cyclists in the transport planning for the new stations and associated precincts

- ensure effective integration of the station precincts with the wider network surrounding the stations
- recommend opportunities to expand the walking and cycling catchments around the Sydney Metro Northwest stations.

In preparing the strategy, consultations were had with local government and the community to identify potential new directions in response to likely changes within the region brought about by recent urban growth and infrastructure delivery.

The Strategy contained recommendations relating to pedestrian and cyclist paths and facilities, standards and rates of provision at each station, as well as guidance, supported by analysis of each station precinct, on requirements to satisfy demand and integrate facilities with the surrounding area. The recommended pedestrian paths around the stations generally have widths ranging between 1.5 metres and 3 metres to provide improved accessibility for customers and cater for high pedestrian volumes. The relevant standards and guidelines for pedestrian paths have been referred to in the report. In general, the pathway typology specified for the Sydney Metro Northwest station precincts comprises a mix of plaza spaces, footpaths, shared paths and on-road cycleways.

Bicycle parking provisions specified to be included in Sydney Metro Northwest have been reviewed and validated against the current and proposed provisions at major transport interchanges across NSW. The station designs safeguard for an increase in bicycle parking provisions in the future.

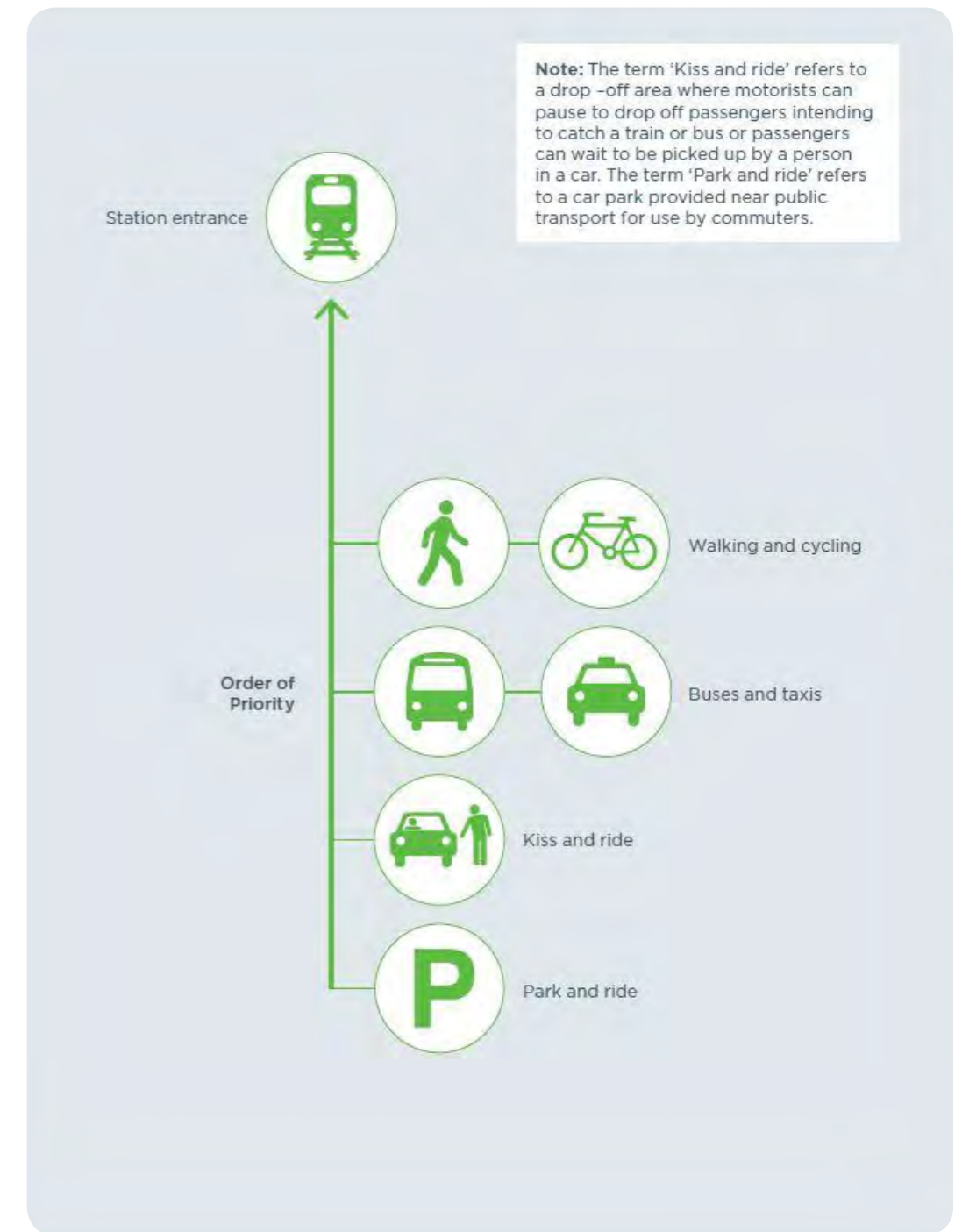


Figure 4.42_Station Transport Access Hierarchy. Source: NWRL Product Strategy January 2012

The general recommendations contained in The Strategy are illustrated in Figure 4.43_ Sydney Metro Northwest Alignment showing 800m walking and 2.5km cycling catchments and are tabulated over the page in Table 4.2 General Recommendations for all Sydney Metro Northwest Interchanges and Table 4.3 Proposed Cycle Parking Provision at Sydney Metro Northwest Interchanges.

In addition to these system wide recommendations. The Strategy contained detailed recommendations to be considered in the design of individual precincts and associated Stations at:

- Cherrybrook
- Castle Hill
- Showground
- Norwest
- Bella Vista
- Kellyville
- Rouse Hill
- Cudgegong Road.

Refer Section 3.1.4 Parking, Pedestrian, Cyclist Access Arrangements and Facilities of this UDCLP for how these recommendations have been incorporated into the design of each station and precincts.

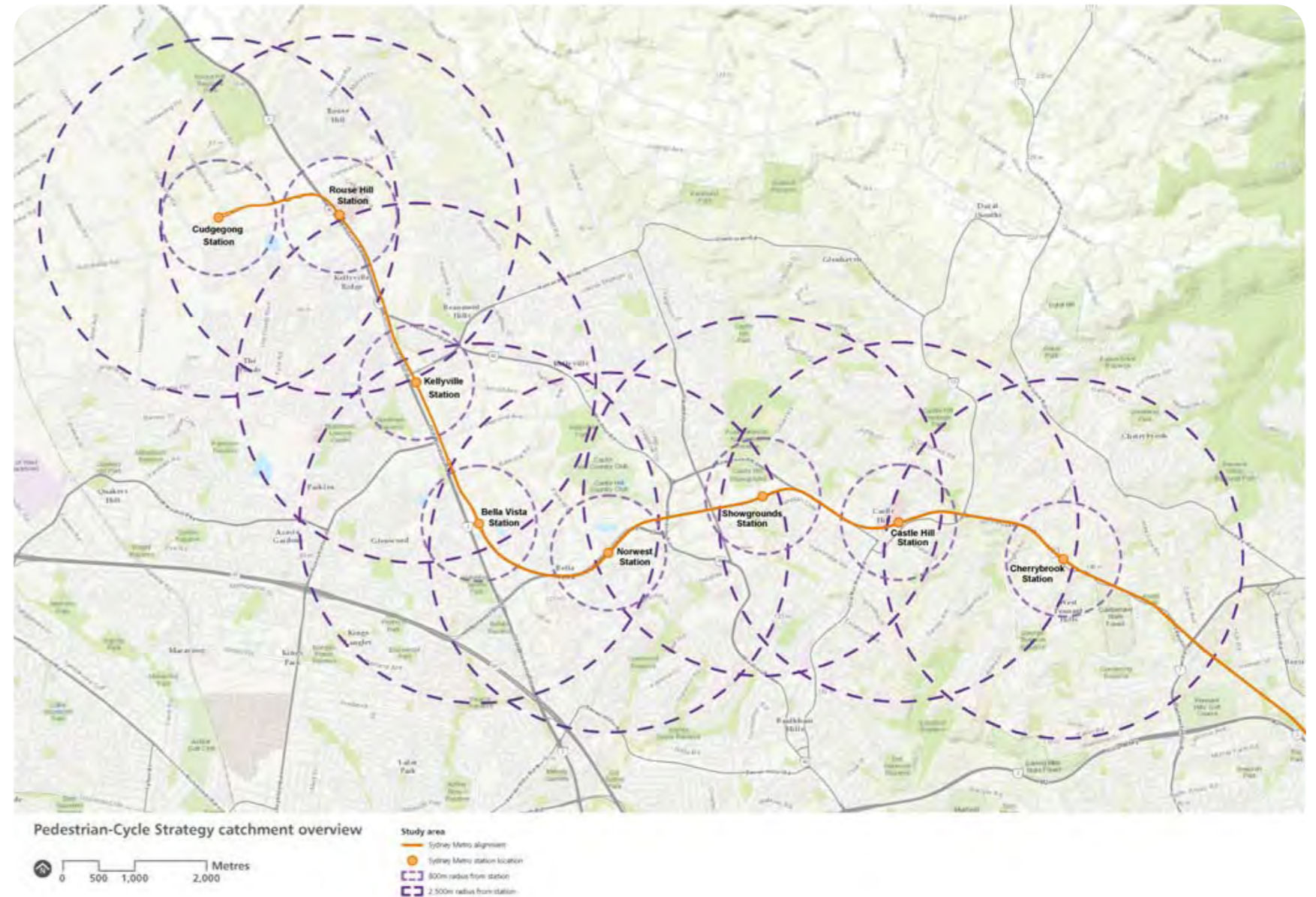


Figure 4.43_Sydney Metro Northwest Alignment showing 800m walking and 2.5km cycling catchments. Source: Tfns

Table 4.2_General Recommendations for all Sydney Metro Northwest Interchanges.

Reference/ Tracking Code	General Recommendations and rationale for all Interchanges
Station Facilities	
1.	In-station signage and maps of the surrounding area: simplified maps with estimated walking times, cycle times, cycle facilities and public transport interchanges.
2.	Consider the installation of CCTV covering cycle facilities to enhance 24 hour security. Consider the installation of help points in bike cages and car parks.
3.	Consider metered electrical charging points in cages for electric bikes. Provide deep scooter lockers / cages for storage of electric bike batteries and electric scooters. Consider metered electrical charging points in storage lockers and cages for electric bikes.
4.	Bike users may choose to keep a bike for end-of-trip usage to make the end-of-trip journey to work. In some instances, customers may choose to leave their bikes in the bike parking facility at the stations overnight. Consider the additional demand this may create on the bike parking facilities at some stations.
5.	Consider the visual connections with destinations to promote use of active transport. In the detailed station design, consider the pedestrian line-of-sight connections to key destinations / landmarks
6.	Provide drinking water amenities for the station customers as part of the precincts.
Surrounding Network	
7.	Undertake a pedestrian path lighting analysis within 400m of each station to enhance pedestrian safety at night. Ensure effective passive surveillance for all major pedestrian and cycle routes.
8.	Over time, existing pedestrian paths can degrade as a result of the effect of tree roots, wear and weathering; and footpaths vary in age and condition. It is therefore recommended that a condition audit and prioritised action plan be undertaken every five years by relevant Councils. Consider the need for footpath grinding, repairs and replacement, where required.
9.	Consider a broader wayfinding strategy within the station catchments that includes signage, footpath and cycle path markings and line-of-sight considerations.
10.	At all signalised intersections surrounding the station precincts, consider the pedestrian and cycle interface through phasing, fencing / barriers, single point crossing.
11.	As some areas around the stations are particularly subject to weather elements, a program of public domain improvement should be considered, including seating, shading, shelter, landscape and urban design treatments be considered along primary corridors to improve the pedestrian and cycle amenity.
Future Development	
12.	Ensure prioritisation of public access and through site links where major development and existing/future open space is being proposed in the vicinity of the station. Ensure the design of pathways considers the needs for 24-hour access for pedestrians, cyclists, and those with limited mobility. In particular, consider security, lighting, gradient, and the need for 24-hour access. Ensure that the pedestrian and cycle guidelines are applied to any new development.
13.	Consider an education program to encourage employers within the catchment to prepare a staff travel plan to encourage the uptake of the Sydney Metro Northwest line, including promoting access by active transport options for staff. Also consider education and cycling awareness programs.
14.	Councils to develop a policy through DCPs, to encourage new major developers within the corridor to provide adequate private, semi-private or public bicycle parking and end of trip facilities within their developments.
15.	Where new development occurs in areas where there are no existing footpaths, developers should be required to extend or join the pedestrian and cycle links when lands are released for development or change in land use occurs. This would provide greater accessibility to the station that is currently restricted by the cul-de-sac street network.

Source: Sydney Metro Northwest Pedestrian – Cycle –Network and Facilities Strategy, June 2015.

Table 4.3_Proposed Cycle Parking Provision at Sydney Metro Northwest Interchanges.

Sydney Metro Northwest Station	Initial		Future	
	%*	Number Spaces	%*	Number Spaces
Cudgegong Road	2.5%	55	2.5	110
Rouse Hill	2.0%	45	2.5	70
Kellyville	2.0%	55	2.5	110
Bella Vista	1.5%	35	3.5	80
Norwest	2.5%	35	3.5	65
Showground	2.5%	45	2.5	70
Castle Hill	1.5%	25	1.5	40
Cherrybrook	1.5%	45	2.0	65
TOTAL (AVERAGE ACROSS ALL STATIONS)	2.0%	340	2.5	610

Source: Sydney Metro Northwest Pedestrian – Cycle –Network and Facilities Strategy, June 2015.

4.8 Parking Management Strategy (Condition C11)

A site specific Parking Management Strategy for each of the new station precincts, is currently under development.

The complexity of the individual new station precincts varies, ranging from the “green field” site conditions of Cudgegong Road Station to the developed residential area of Cherrybrook Station.

The Parking Management Strategy refers to Ministers Conditions of Approval (MCoA) F3 Traffic Monitoring. This requires Traffic changes on local roads around each station shall be monitored. Monitoring shall be undertaken 12 months before opening and for a period of no less than 12 months after opening. Should monitoring indicate unacceptable traffic intrusion on local roads/streets as a result of operations reasonably beyond that predicted in the EIS and/or Station Access Plans (MCoA C5), appropriate traffic management measures to mitigate the impacts of intrusive traffic in affected areas shall be implemented following consultation with RMS and the relevant Council(s).

The Traffic and Transport Liaison Group is being consulted on an ongoing basis. Any supplementary analysis required by the group will be undertaken as required by Ministers Conditions of Approval C9.

Refer Section 3.1.4 Parking, Pedestrian, Cyclist Access Arrangements and Facilities of this UDCLP for how the parking management strategy has been incorporated into the design of each station and precinct.



Figure 4.44_Artist Impression of Bella Vista Multi Level Car Park. Source: Ai3D

4.9 Signage and Wayfinding Strategy

A clear signage and wayfinding strategy is an essential component of the efficient operation, safety and convenient use of public transport. Its main features are as follows.

Integrated at a diversity of levels by:

- providing users with concise directions, seamlessly from precinct arrival to train boarding
- being integrated with the TfNSW system wide multi-modal wayfinding system
- being integrated with other non-transport related information, direction, advertising, safety signage as well as public art and interpretive signage and lighting throughout the precinct to minimise user confusion.

A hierarchical approach:

- according to zones depending on location and function such as precinct, car parks, concourse, platform, back of house, staff and statutory signs as well as special purpose buildings such as the service buildings.
- according to importance of the message via the location and size of signage elements.

Station Identification

Mode identification signs (sometimes called totem signs) have been developed by TfNSW. These are used as the primary station identifier. Two sizes allow for a main sign for long distance identification and the smaller version as a repeater or remote sign.

Finger Posts

All stations will have extensive landscaping and public domain areas. Each station will interchange with bus and taxi services and car parks will be available at some stations.

Directing passengers and non-passengers around these extensive precinct areas will require a network of signs. The blade signs are too big to be used beyond the primary plaza and the only other signing product available is the simple finger post sign. The design for these is offered by TfNSW as either a free-standing unit or versions which can attach to existing lamp posts or other street furniture.

The finger post signs are extremely flexible. Multiple sign planks can be mounted to a single post to offer four or even more directions.

Blade Signs

One of the most useful signing products developed by TfNSW is the 'blade' sign. These free standing units will be used outside of the stations, usually in the primary plaza areas.

They offer a double sided presentation which can include a poster frame and a multi-line directional sign. For helping with general orientation for passengers leaving the stations, these signs are going to perform really well.

The directional sign panel on the top can be varied in size but it will generally offer space for up to five or six directions. The poster frame is ideal for locating the local area maps.

The way the signage and wayfinding strategy has been applied throughout the project precincts and facilities is described in Section 3.3.8 of this UDCLP.

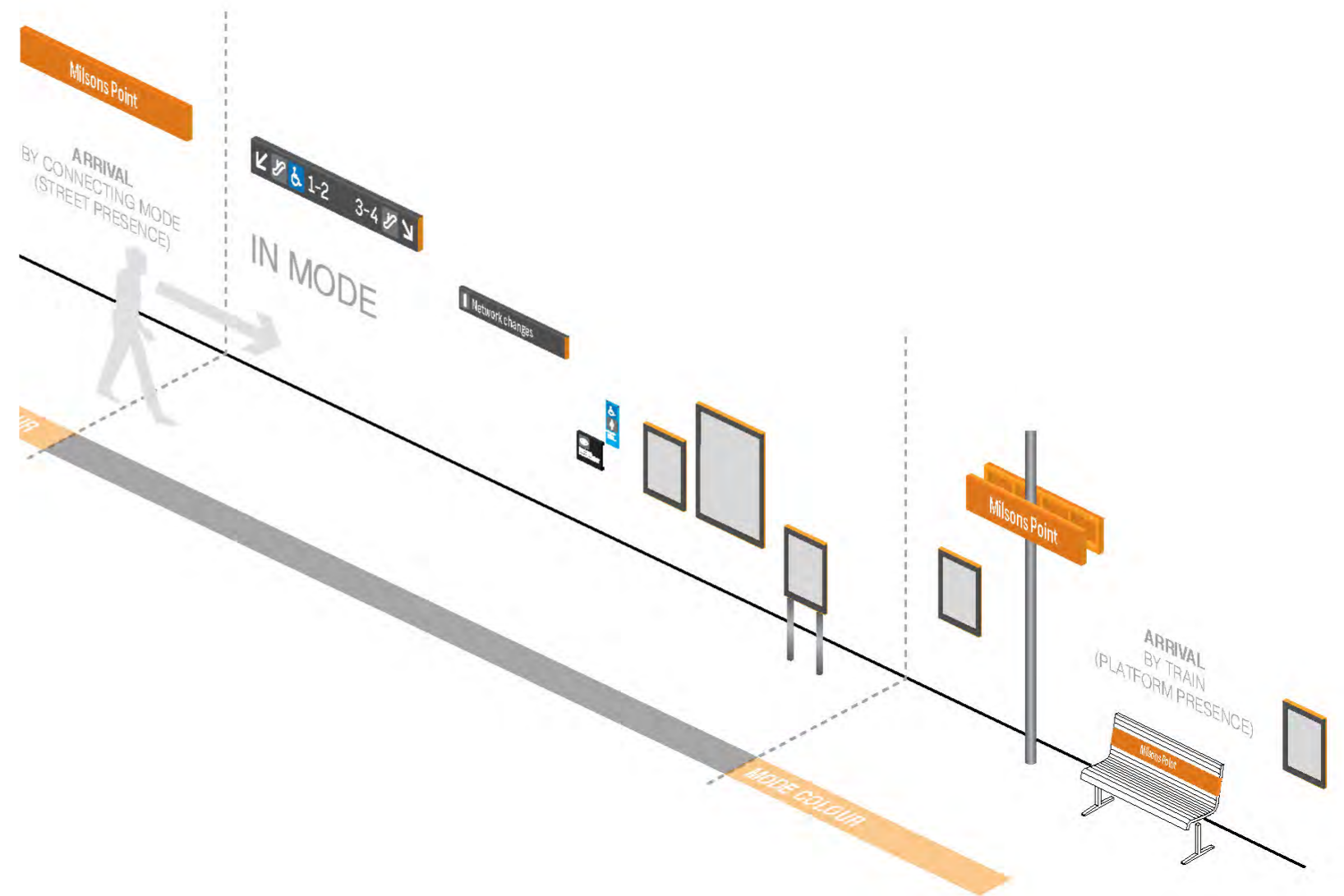


Figure 4.45_Wayfinding Strategy for Station Precincts illustrating Signage Elements Suite. Source: Wayfinding Strategy 2015.

4.10 Aboriginal Archaeological and Cultural Heritage Interpretation Installations

4.10.1 Conceptual Framework

The history and heritage values of the project area are recognised and presented in a number of previous reports prepared for the project. A draft report “Sydney Metro Northwest - Heritage Interpretation” by Artefact is currently under preparation. This outlines concept proposals for signage to be installed in various locations across the SMNW precincts. Proposals for each precinct are outlined in Section 3.2.5 generally and 3.2.4 for the Skytrain Corridor Precinct of this UDCLP and summarised below.

Heritage interpretation aims to communicate the values or significance of a heritage item or place to the intended audience/users of the place. Heritage interpretation can be achieved in subtle ways such as integrated design options or in more obvious ways such as fixed information panels.

Interpretive signage to communicate heritage values are intended to be sited in various locations across the Sydney Metro Northwest precincts.

The approach is:

- to create a journey through the changing landscape of North West Sydney
- recognise a landscape filled with traces of those who travelled before.

The interpretive signage will include text and imagery and is intended to provide snapshots of key historical developments and heritage significance of the site and surrounding landscape. The design and materiality of the signs will link to the overarching station and precinct design.

The sites proposed for heritage interpretation are:

1. Arthur Whitting Park / Castle Hill Station;
2. Showground Station;
3. Kellyville Station and
4. The shared path which includes the White Hart Inn site.

A storyline has been developed for the interpretation signage to allow a theme and relationship between the signs in the various precincts. The keywords of the storylines are outlined below. These will be the focus of the interpretation signage in the precincts:

Journeys

1910, tram, steam train, goods siding, markets, terminus, commuters.

Aboriginal Journey

Dharug, backed artefacts, silcrete, Pemulwuy

Settlers Journey

Old Windsor Road, Early nineteenth century, settlers, farmland, archaeological excavation, Mungarie

Agricultural Journey

Government Grounds, model farms, pioneers, orchards, farms, Joseph Harrison, Will Williamjohn, Ridlington Estate

Commuters Journey

Inala, Glenhope, Federation mansions.

Travellers Journey

1820s, Old Windsor Road, James Gough, inn, White Hart Inn archaeological site, pub

Arthur Whitting Park

Councillor Arthur Whitting 1908-1948, remembrance, RSL, Memorial Hall, community centre, ANZAC

A Community’s Showground

1890s, rural tradition, agriculture and produce, prized animals and displays.

4.10.2 Future Opportunities

Some further options to communicate heritage values which can be developed are contained in the North West Rail Link Aboriginal Archaeological and Cultural Heritage Interpretation Options advice prepared by Kelleher Nightingale Consulting Pty Ltd (November 2014), are summarised here.

Recognition- Station Naming

The Aboriginal place name for a station explained where appropriate, the English station name in parentheses - e.g. Cudgegong Road (Red Hill).

Tours of Site-Based Interpretation

Creation of formal tours could be offered to the public on demand (run by informed volunteers) and may link in historical archaeology, history and development of the Sydney Metro Northwest.

Educational Materials or Links

These could be developed independent of the project construction works and include:

- Take-away information such as a brochure or small publication available at stations - these could offer a short interpretation/history of the area as well as details related to other interpretation options such as station decoration/ artwork.
- Apps/links to websites with information
- Catalogue of material/information recovered - shows significant connections and use of the area by Aboriginal people over a long period of time but may need to consider whether this would be too much detail for casual users and may be more appropriate as

an education package for local libraries or schools.

Displays

These could be developed independent of the project construction works and include:

- Small exhibition - could be rotating exhibition with other Sydney Metro Northwest findings (e.g. historic material)
- Glass/Perspex exhibits - display cases - within the building walls, escalator walls or floor of stations - displays would include brief descriptions of the past land use and customs of Aboriginal people and faux Aboriginal objects (perhaps even axes, spears, shields etc).

Other Initiatives

Aboriginal cultural heritage information, associated with the construction of the Sydney Metro Northwest project, could be presented on project or Government websites or in books/pamphlets about the project could include:

- stories about the project;
- participation of the local Aboriginal community in the project;
- extensive program undertaken to recover significant Aboriginal cultural heritage materials before construction;
- findings of the program;
- what it means and tells us about the area;
- key connections in time and place (e.g. Pemulwuy);
- contemporary cultural connections/ attachment and significance of the area; and
- recognition of the long history of attachment to/use of the area.

4.11 Public Art Plan

4.11.1 Public Art Plan Conceptual Framework

Memory and Place

The remembrance of the area's rich agricultural past to imagine its rapidly developing urban future conceptually embeds *Light Line Social Square* in place. In sourcing the conceptual framework from the past, the meaning, materiality and form of each element of the art project is imbued with an enduring sense of place.

Memory and place are expressed through the guiding frameworks of the grid, colour, light and time, interwoven with the expression of play, network and connection. Environment, ecology and expressive sustainability are also integral to the meaning, form, layout and interrelationship of all elements in *Light Line Social Square*.

Sydney's Northwest was once a significant food bowl for Sydney and orchards covered much of the land surrounding the stations precincts and corridor. This rural history is still relatively recent for the people of the Hills District and the Cumberland Plain. Local identity is therefore deeply rooted in agricultural history and is still today celebrated in annual community festivals including the local Orange Blossom Festival and the Eastwood Granny Smith Festival.



Figure 4.47_Warren Rowles- Retired Orchardist. Source: Urban Sprawl eats into Sydney's farmland, The Sydney Morning Herald 2013.

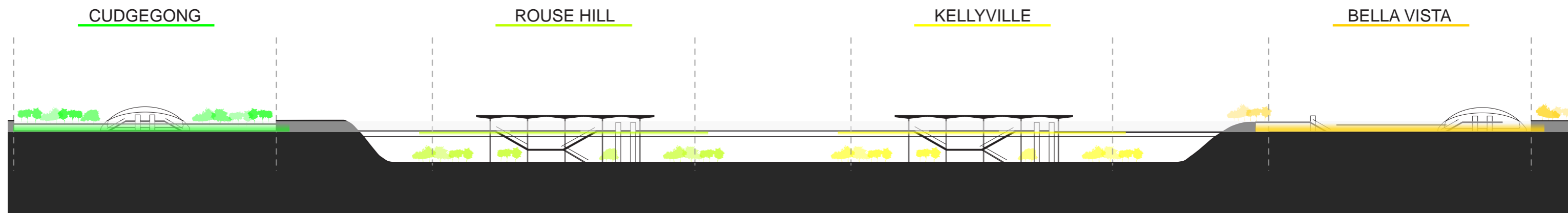
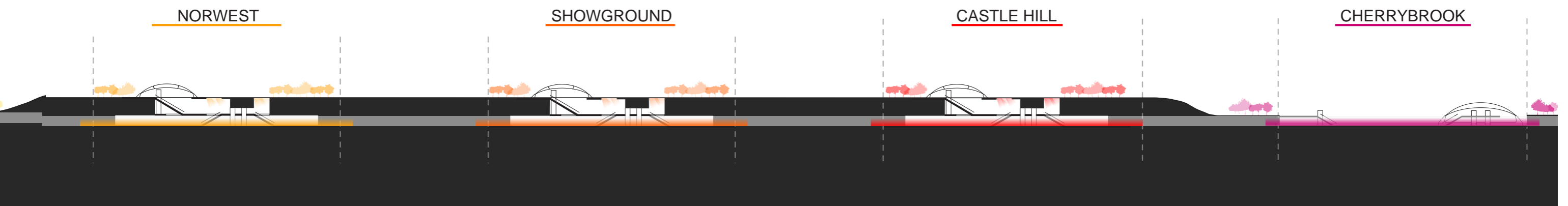


Figure 4.46_Line Wide Public Art Plan Sections for Station Precincts illustrating Light Line Concept . Source: MWA with T+C Studio.



The Grid + Grove

The characteristic grid of the areas's historical orchard groves is borrowed to provide an identifiable structure and order to the station precincts within the enveloping urbanity of Sydney's rapidly developing northwest.

The Grid of the farm becomes the Grid of Grove and station plaza. Just as historic photos and drawings of the early orchards show them as distilled images of order and culture within the rich envelope of the indigenous bushland, so too the public domain of the station landscape will stand as a distilled, legible and memorable image within the complexity of the surrounding urban environment.

The grid becomes the organising framework for all the engineering, architectural, landscape and art elements, that form the public domain, including the beams that support the station landscapes above the cut and cover stations, the skylights/lanterns that punctuate and perforate their ceilings, the groves setout within all the station plazas and the sculptural play elements arranged within these groves.

The main buttresses of the station canopies are the setout point for the grid. In this way the station structures are given primacy much like the European church in relation to it's square.

Here the square is the Urban Grove in which the elements of the public domain are orchestrated into a fine grain of legible, flexible, permeable spaces.

The reinstated indigenous planting throughout the rail corridor and station streets will further frame the cultural trees of the urban groves. In remembering the past to create these new station spaces, meaning and place is thus embedded into the geometry, scale, character and qualities of the line wide station landscapes.

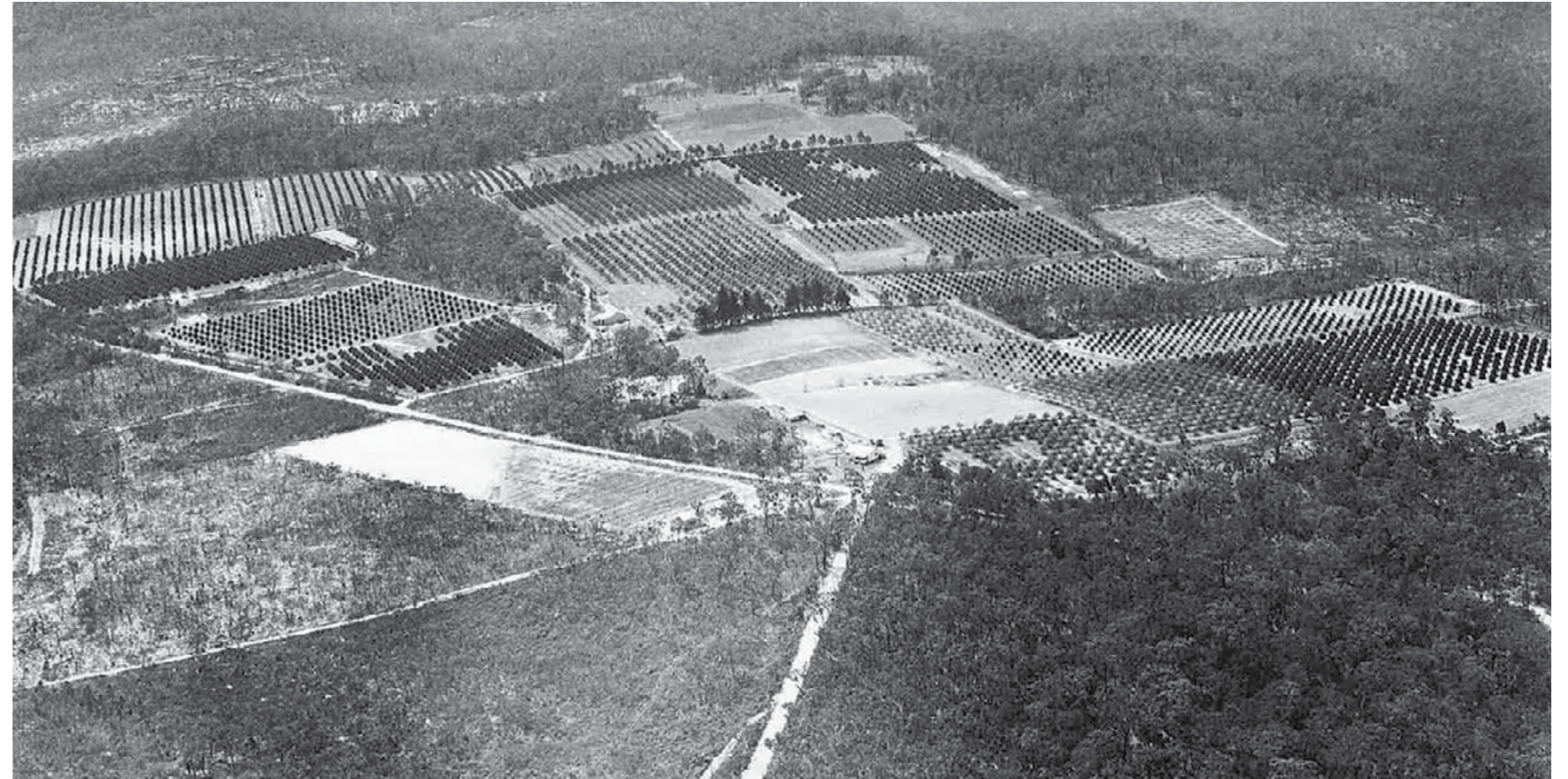


Figure 4.48_Hills District Citrus Orchard 1940s. Source: Pictorial History The Hills District, Kingsclear Books 2013.

Colour + Light + Time

Station Name	CUDGEGONG	ROUSE HILL	KELLYVILLE	BELLA VISTA	NORWEST	SHOWGROUND	CASTLE HILL	CHERRYBROOK
Station Colour The Colour layer is line wide and episodic within architectural, landscape and art elements								

Station Colour
The selected station colour references place and history



Transparent colour
Transparent colour in Skylight Lanterns, Light Screens and Vertical Transport casts light on architectural surfaces

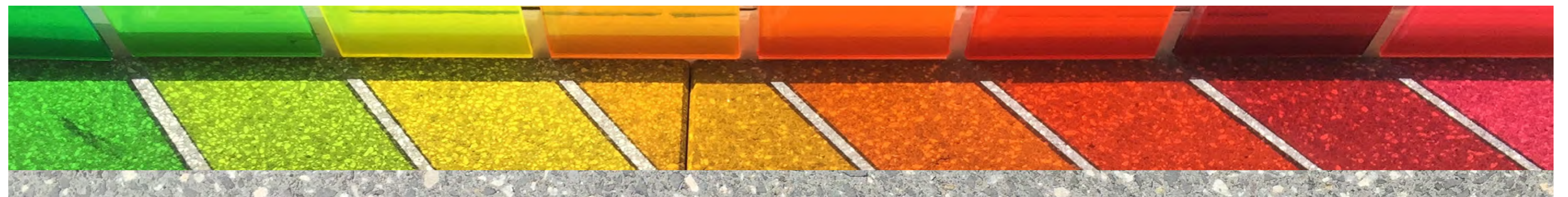


Figure 4.49_Public Art Plan Colour, Light and Time Concept. Source: MWA with T+C Studio.

Colour + Light + Time

The vibrant colours of the region's varied orchard produce are given expression in the line-wide colour spectrum and station specific colour palette.

The reds, oranges, yellows and greens have been developed into eight station identity hues that permeate and identify all elements of *Light Line Social Square* with place specific meaning.

The station identity colours are manifest via light, both natural and electronic and will highlight the passing of time over the seasons, the day and the network.

Colour is environmental and seasonal in the Urban Groves and highlighted with moments of saturated colour in the Social Spheres sculptural elements.

It is transparent and diurnal in the line-wide suite of coloured glazing including Skylight Lanterns at the cut and cover stations, Light Screens at the viaduct stations and vertical transport at all stations.

Colour is electronic and programmed in Light Line's line wide, fully automated, platform and station threshold lighting installation.

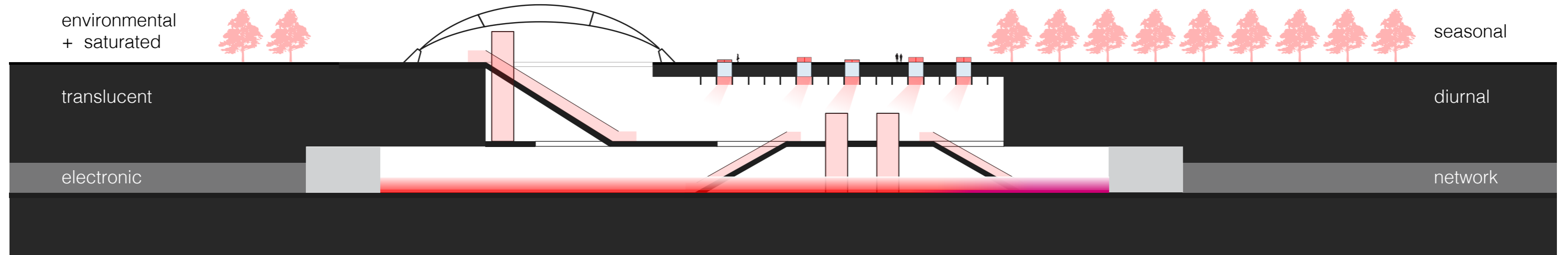


Figure 4.50_Section Illustrating Colour + Light + Time Concept . Source: MWA with T+C Studio.

Play

The spirit of play is integral to the creation of places of delight and respite. Play will be expressed incidentally and through playful elements and play 'rooms'. It will also be expressed through the 'play of' environmental light on ceilings, walls and floors and the programmed play of electronic light. Creative play will also be a component of the community art program in the delivery and operational phases.



Figure 4.51_Artist Impression of Play Elements at Rouse Hill. Source: MWA with T+C Studio.

4.11.2 Public Art Plan Key Elements

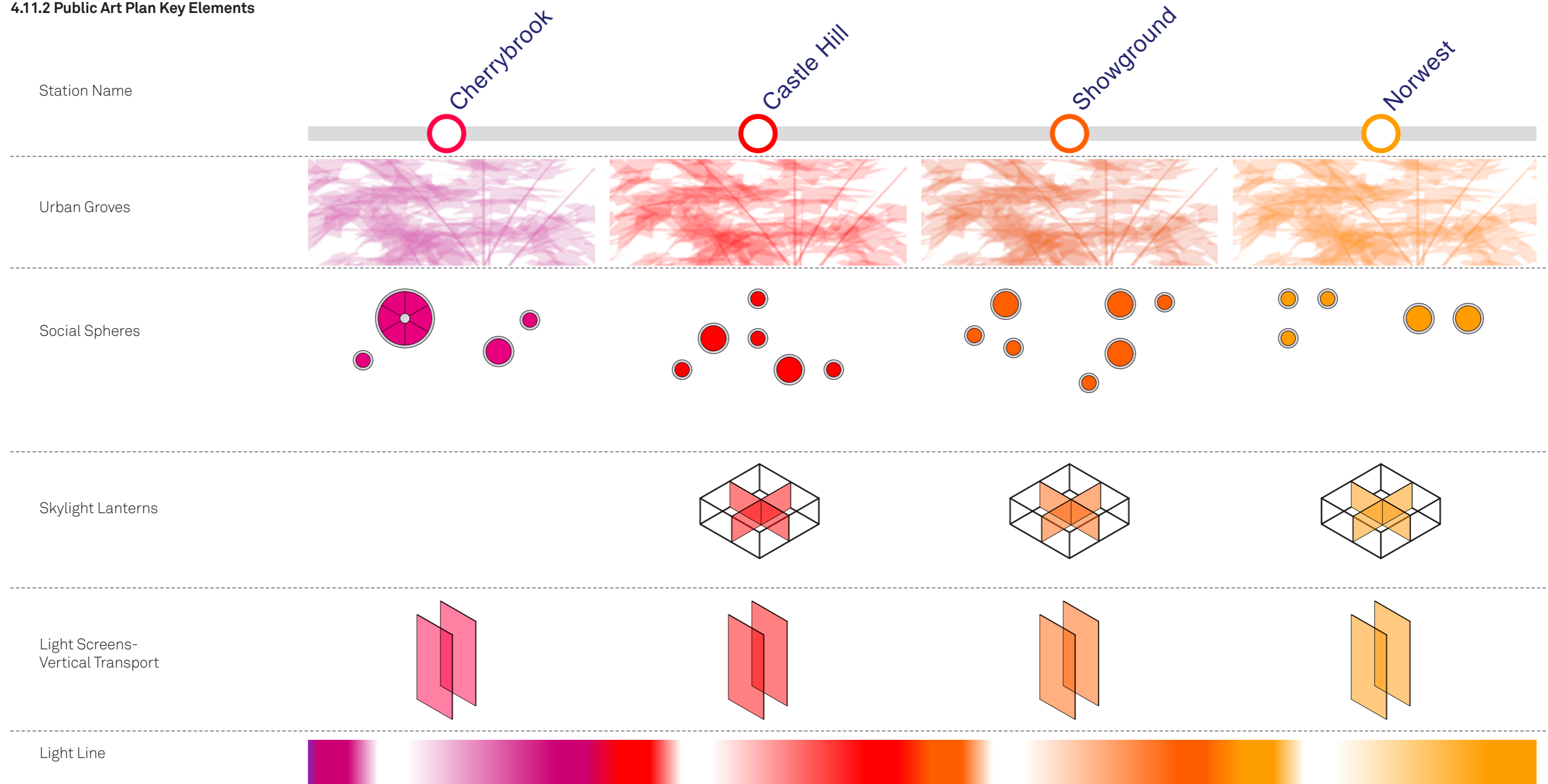
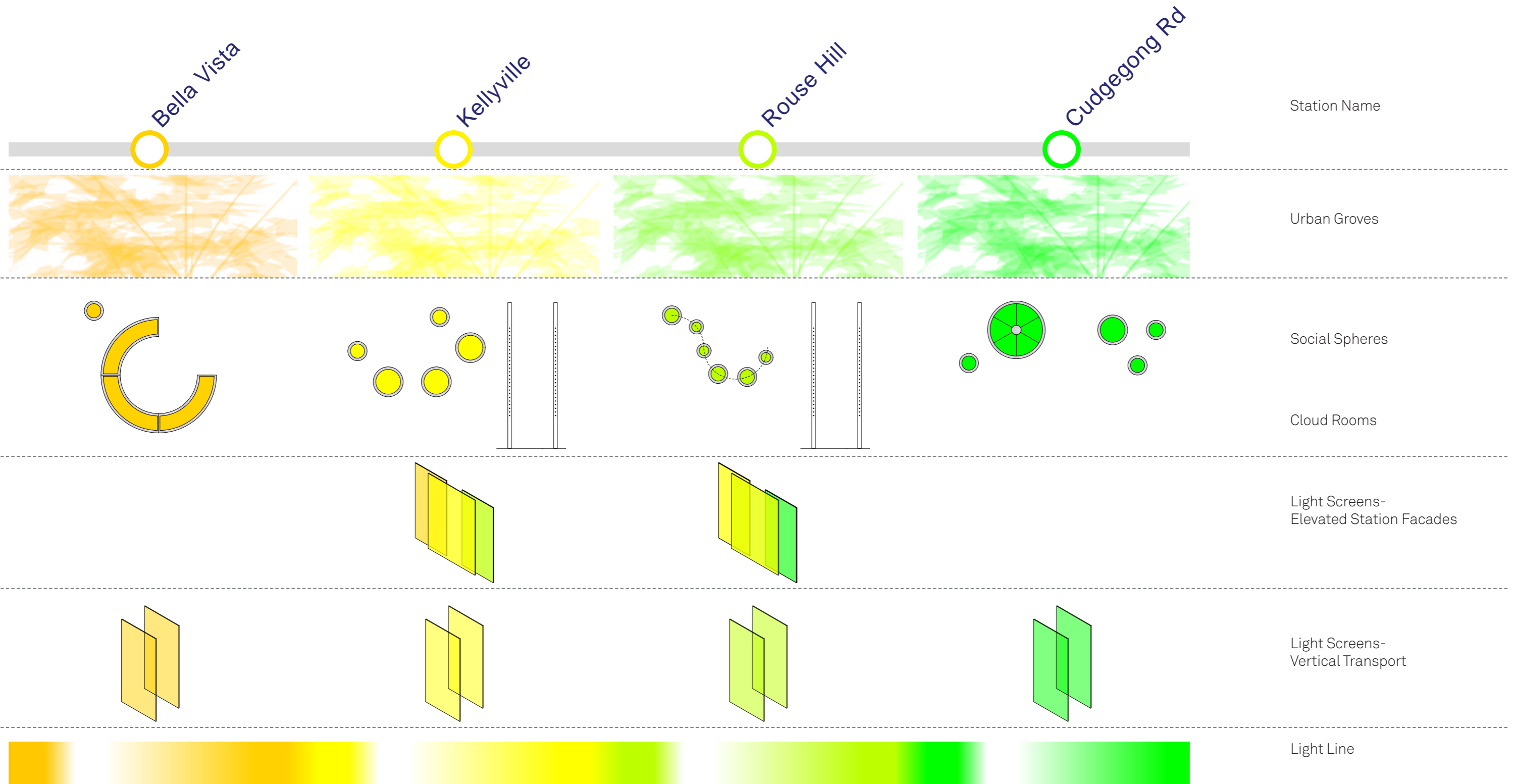


Figure 4.52_Allocation of Public Art Elements across Station Precinct. Source: MWA with T+C Studio.



Urban Groves

The Urban Groves comprise of a singular tree type and understory planting, laid out within the flexible framework of the grid, to create a memorable identity for each station square.

The productive trees of the original orchards of the northwest are interpreted through the use of flowering evergreen and deciduous, native and exotic trees to give further expression to the line-wide Colour + Light + Time framework.

The groves are framed by an indigenous tree canopy reinstated along the primary station streets. They will reference the striking linear geometry of the area's historical orchards where regular lines of productive planting sat within the clear geometry of the field, framed within the natural growth patterns of the bush.

Their environmental colour will mark seasonal and annual time and contribute to the creation of a network wide, local station identity.

The grid of the groves will facilitate the artful arrangement and integration of the other elements of Social Square including skylight lanterns sculptural elements, incidental play, 'Cloud Room' mist installations and integrated lighting as well as the layout of landscape elements such as paving, steps and walls.

The layout of the groves is responsive to the particular spatial characteristics and circulation requirements of each station. The trees and plants of the Urban Groves will create a rich and colourful rhythm across the network of stations.

The Urban Groves combine with the surrounding indigenous canopy to provide much needed shade in hot western Sydney summers, and where deciduous, solar access in winter.

In an iterative process with Hassell, the Urban Groves have undergone continuous development and refinement including the resolution of issues such as:

- Species selection, including understory and terrace planting, consistent with the line-wide colour concept.
- Detailed layout and adjustments of planting modules to reflect the differing spatial character of each station plaza.
- The facilitation of these grove and plaza layouts to accommodate sculptural and play, mist and skylight elements.
- The balance between understory planting and paving in terms of plaza spatial character.

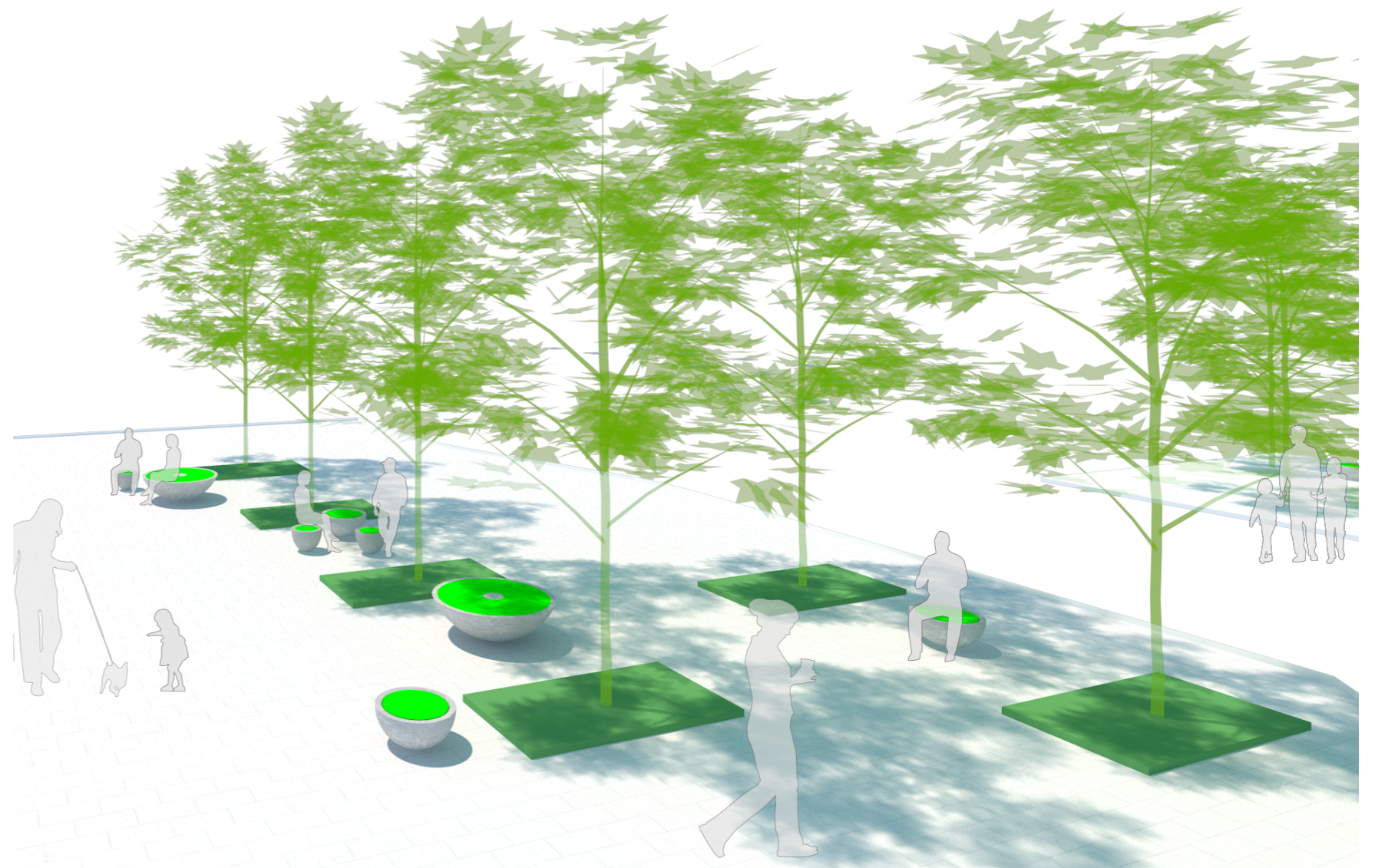


Figure 4.53_Artist Impression of Cudegong Road Station Public Art Urban Grove. Source: MWA with T+C

Social Spheres and Play Elements

Sculptural urban elements, conceptually embedded in place, will playfully and artfully interpret the area’s original orchard produce in each station colour.

The sculptural elements are playful and joyous in form and arrangement and create highlights of saturated, station specific colour within the station public domain.

The sculptural elements and integrated lighting will facilitate social spaces providing places of rest, contemplation, meeting, play and gathering. They will frame and be arranged in response to other Social Square elements including urban elements, street furniture, multi- purpose pavilions and play areas.

The round geometry of the sculptural elements complements and juxtaposes the linear geometry of the grid and the square geometry of the skylights.

Incidental and Ground Plane Play

Hopscotch and four square ground plane motifs in station colours create incidental play within the landscape whole. They are incidental elements laid out strategically within selected urban groves.

Play is integral to *Light Line Social Square* and is expressed in multiple ways including the inherent qualities of the sculptural social spheres, the playful cores and the mist rooms located at Rouse Hill and Kellyville. Hopscotch and four Square form this last whimsical component of the broader suite.

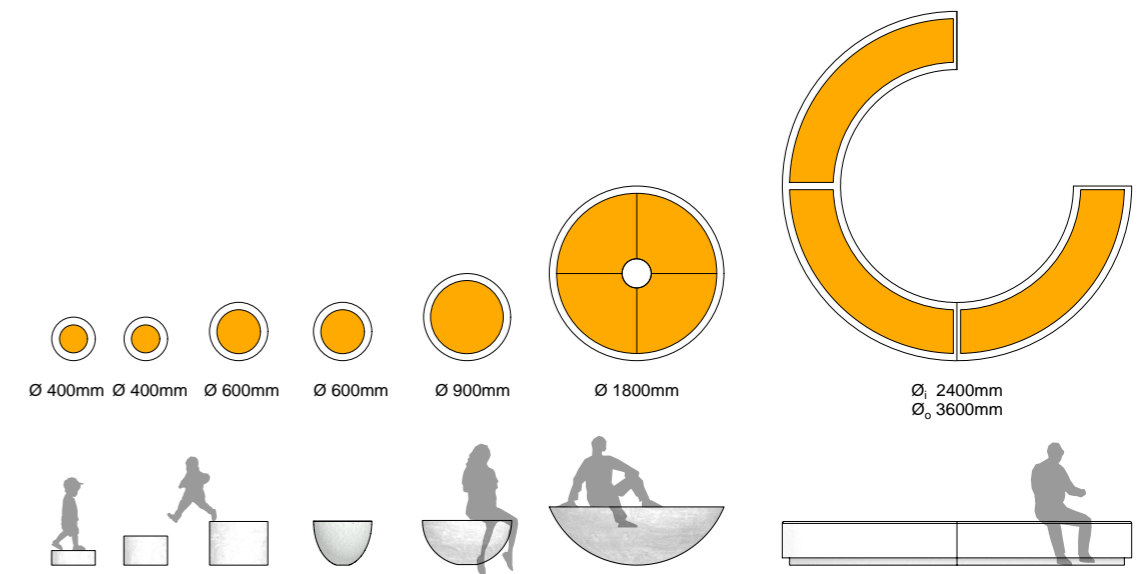


Figure 4.54_Social Spheres Sculptural and Play Elements. Source: MWA with T+C Studio.



Figure 4.55_Incidental Play. Source: MWA with T+C Studio.

Cloud Room Installations

Cloud Room installations will create areas of super fine mist, like a diaphanous cloud, within the groves of Kellyville and Rouse Hill. The mist will be both seasonal and ephemeral.

The elemental and environmental installations are both playful and cooling in the hot Australian summers. They can operate in summer during morning and evening peak hours and at midday. The mist appears for short periods and can shut down in rain or high wind.

The anticipation and memory of the event is an important component of the installation and contributes to *Light Line Social Square's* concept of time and place.

The Cloud Room will be framed and contained within the larger groves of Kellyville and Rouse Hill. In turn, contained within both Cloud Rooms is a hopscotch court, an urban scaled playful paving layout that will animate the space with and without the mist.



Figure 4.56_Precedent of Mist Poles at the Children's Museum, Pittsburgh. Source: Pittsburghkidsorg.

Skylight Lanterns

The Skylight Lanterns are illuminated and illuminating elements within the landscape field of the grove, and above the large subterranean voids of the concourse spaces within the cut and cover stations. They are a repeated element laid out both strategically and playfully within the grid and landscape field amongst the trees, plants, grass and sculptural social spheres.

The skylights will act as lanterns that manifest the interplay of natural and artificial light as day transitions to night.

The Skylight Lanterns marry science and art to efficiently and poetically achieve solar access to deep cavernous and grandly scaled station halls.

Coloured glass in the skylight reveal, and coloured translucent planes of glass above and below the reveal, will wash and bounce cast and reflected coloured light onto the subterranean ceilings, walls and pavement.

Illuminated by the sun in the day and by LED light at night, the Skylight Lanterns transform both the landscape above and the subterranean space below with translucent and cast colour and light.

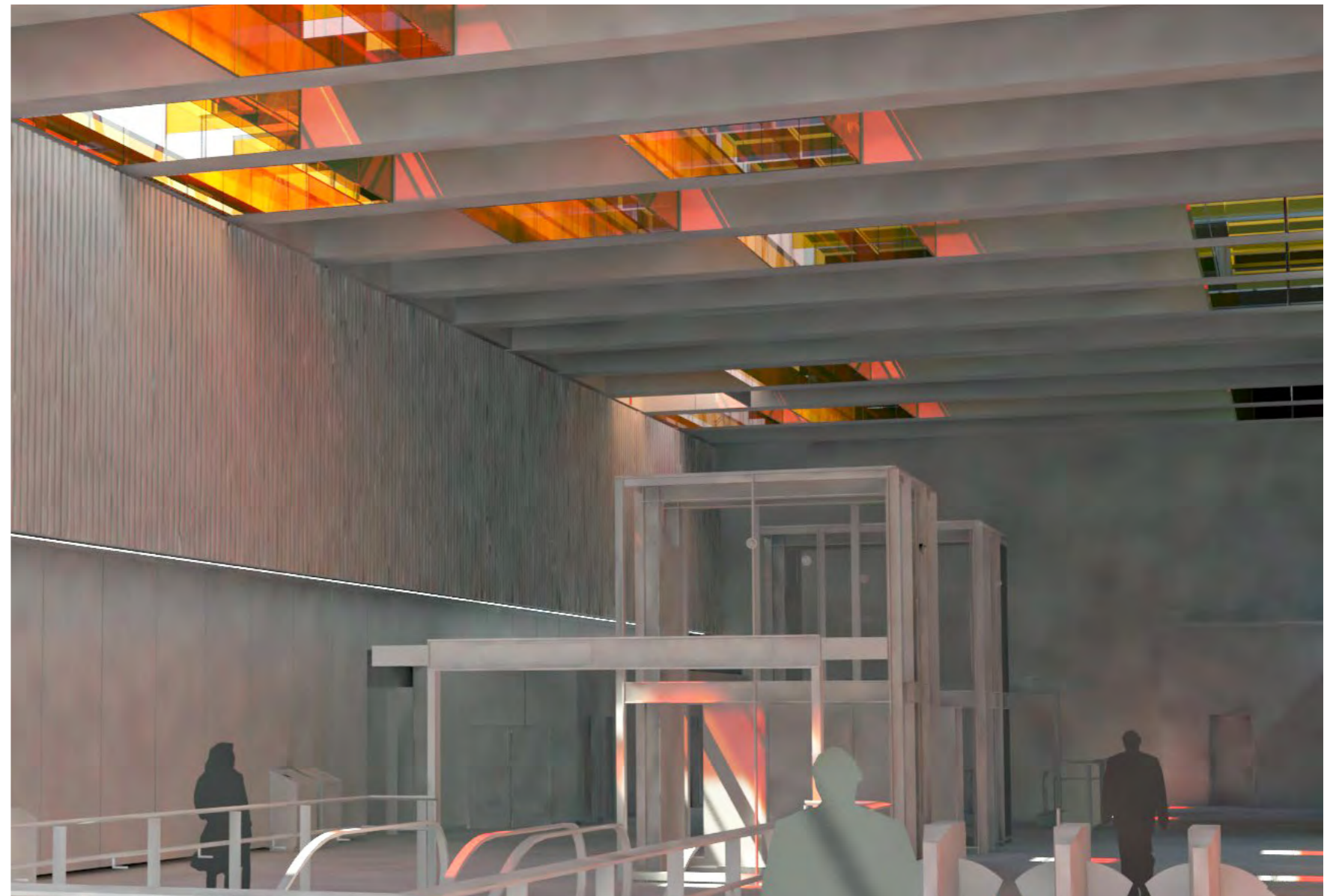


Figure 4.57_Skylight Lanterns at Norwest Station. Source: MWA with T+C Studio.

Light Screens- Vertical Transport

The conceptual drivers of colour + light + time will be given monumental scale across both facades of Kellyville and Rouse Hill. The station colour, laminated within the minor vertical glazed sections and laid out along the facade is playfully melded with subtle insertions of the adjoining station colour palette.

The ever changing angle of the sun will cast continually transforming colour and pattern onto escalators, elevators and the public concourse below.

The line wide deployment of transparent glazing elements reflects the collaboration between artists and architects and the cohesive integration of *Light Line Social Square* into the Station designs.



Figure 4.58_Artist Impression of Light Screens at Rouse Hill Station. Source: Ai3D.



Figure 4.59_Artist Impression of Vertical Transport and Light Screens at Rouse Hill. Source: Ai3D.



Figure 4.60_Artist Impression of Vertical Transport Light Screens. Source: Ai3D.



Figure 4.61_Artist Impression of Vertical Transport Light Screens. Source: Ai3D.

Light Line

Light Line is a simple concept seamlessly laid out as a line wide element across the Sydney Metro Northwest network, potentially retrofitted to the ECRL network and included in any future metro development.

This line wide concept of a subtle signalling light motif has always been key to the original concept and the final agreement on the inground platform form has a great strength and simplicity whilst addressing the very pressing issues of cost, complexity, safety and maintenance.

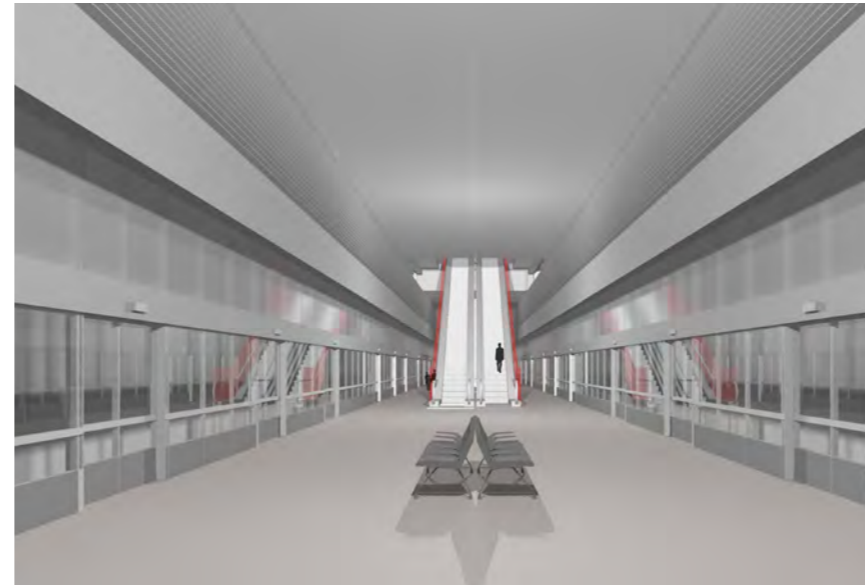


Figure 4.62_Light Line at Castle Hill Station, Awaiting Train. Source: MWA with T+C Studio.

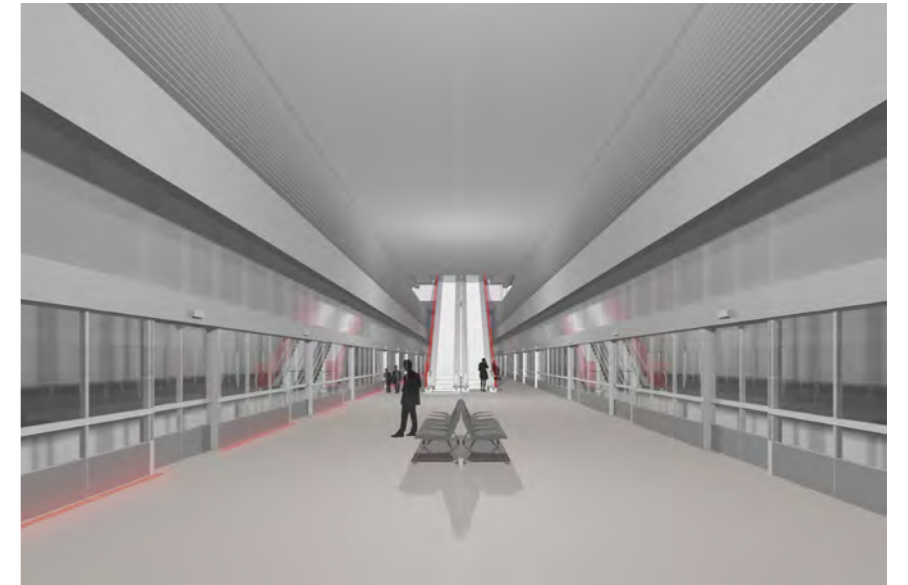


Figure 4.63_Light Line at Castle Hill Station, Incoming Train. Source: MWA with T+C Studio.

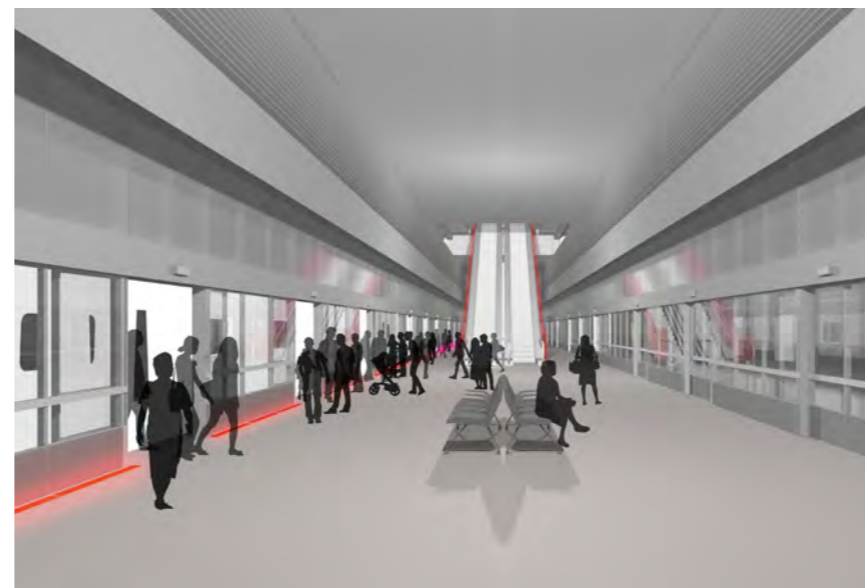


Figure 4.64_Light Line at Castle Hill Station, Train Arrival. Source: MWA with T+C Studio.

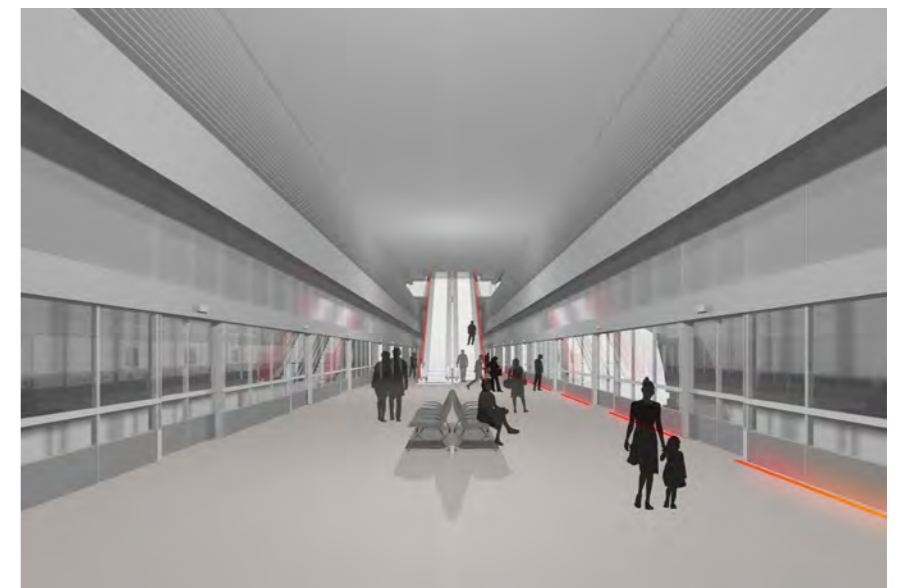


Figure 4.65_Light Line at Castle Hill Station, Train Arriving. Source: MWA with T+C Studio.

4.12 Built Elements Typical System Wide Design Details

4.12.1 Introduction

The 'Kit Of Parts' (KOP) is a concept designed to boost legibility and identity of the system architecture. As patrons move through the precinct and into the station plazas, key buildings, materials and forms begin to emerge. The KOP enables a sense of familiarity in the station environment and, in doing so, aids customer experiences such as wayfinding.

The KOP has similar benefits in procurement by producing a series of standardised details. This systemised architecture promotes a strong Sydney Metro Northwest brand while increasing quality and efficiency of station buildings.

Three typologies have been conceived as part of the project that connect the precinct to the Sydney Metro Northwest line.

Open Cut (Figure 4.63)

This typology is used when the level of the train line and the ground level are similar. The stations are designed to move patrons horizontally across the precinct into the station.

Cut and Cover (Figure 4.64)

This typology is used when the level of the train line is well below the ground level. The stations are designed to invite users below the precinct into the finely detailed subterranean station volume.

Elevated (Figure 4.65)

This typology is used when the level of the train line is above the ground level. The stations are designed to raise users above the precinct through the station.

4.12.2 Key Elements and Zones

The key elements of the kit of parts are illustrated in the adjacent axonometric drawings for each typology and comprise the following.

1. Concourse Canopy
2. Platform Canopy
3. Vertical Transportation
4. Service Buildings
5. Concourse Pods
6. Screens, Balustrades and Fences
7. Platform
8. Pedestrian Bridges
9. Pedestrian Underpass
10. Facades
11. Car Park
12. Skylights

The design drivers, design intent and details for the individual elements are described and illustrated in the following sections of this UDCLP.

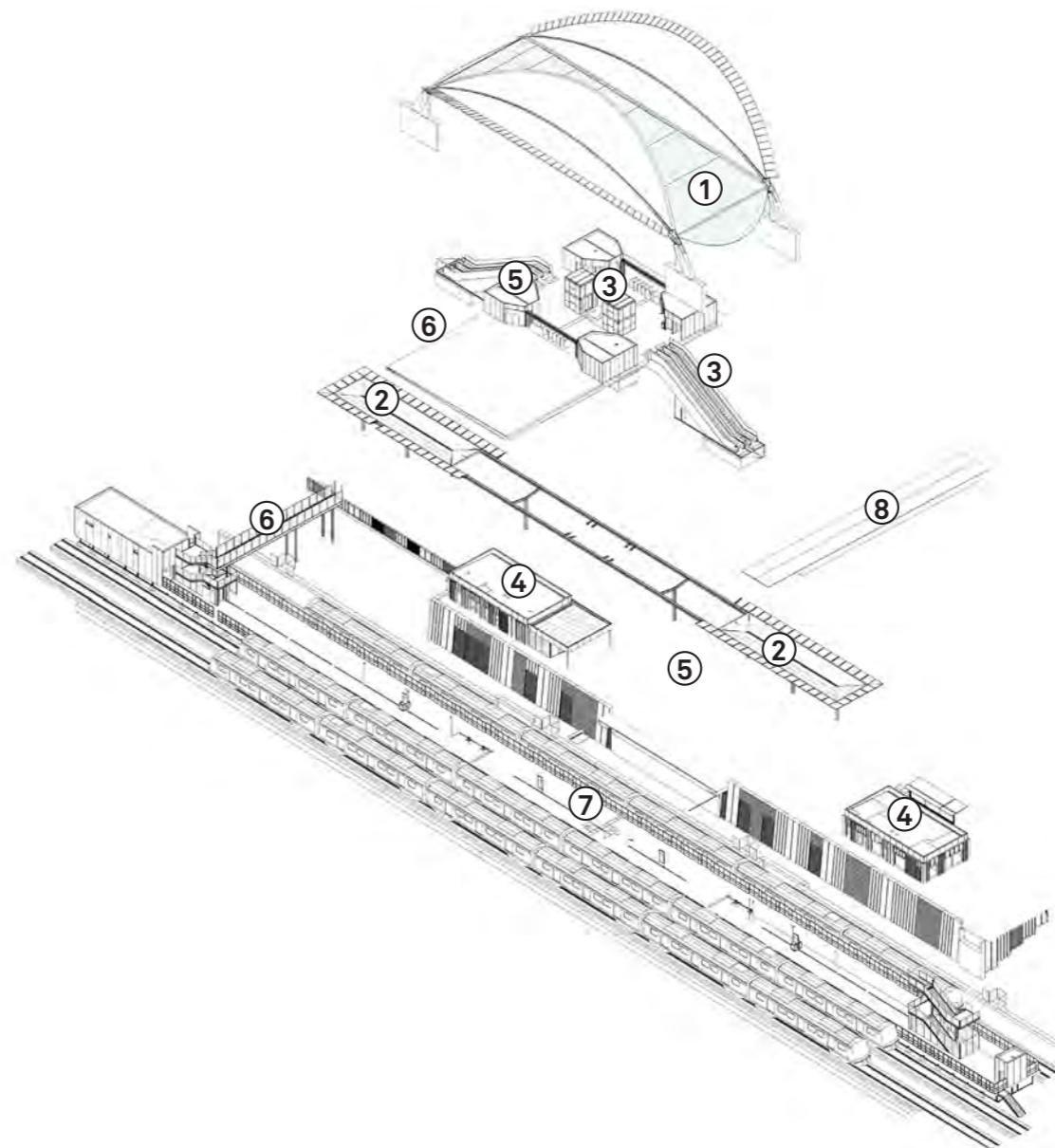


Figure 4.66_Open Cut Station Diagram. Source: HASSELL

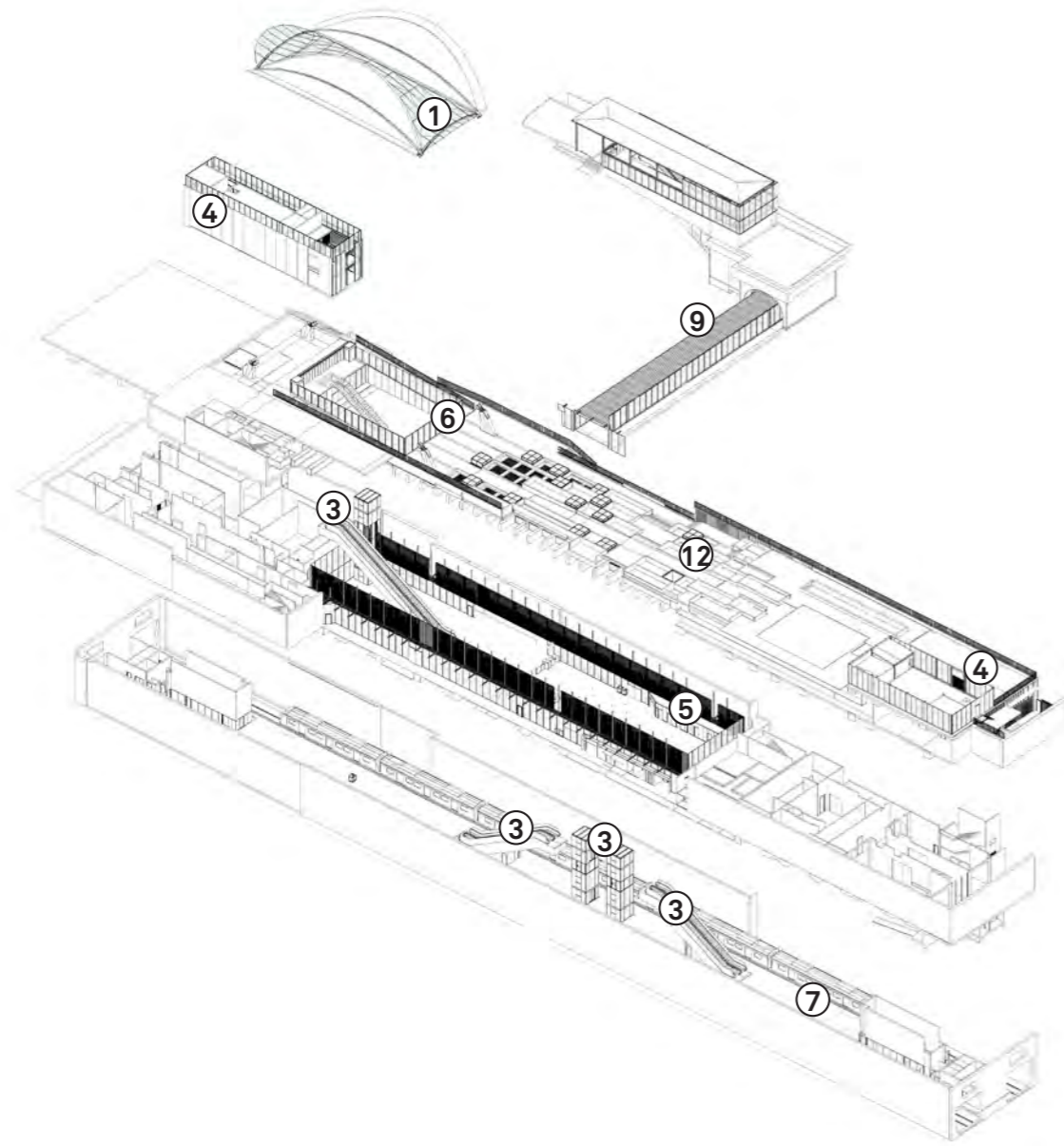


Figure 4.67_Cut & Cover Station Diagram. Source: HASSELL

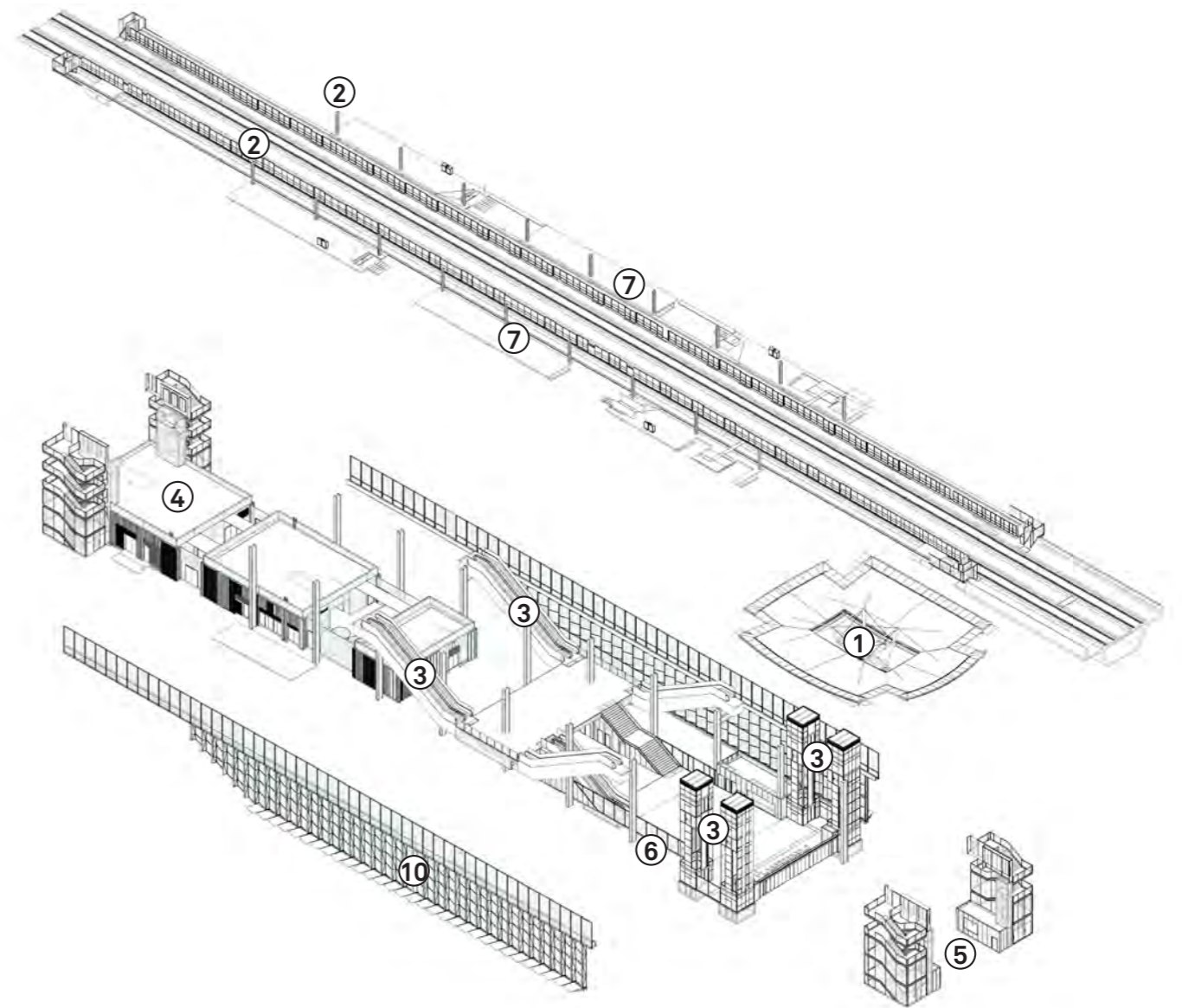


Figure 4.68_Elevated Station Diagram. Source: HASSELL

4.12.3 System Wide Entry Canopy Model

Design Intent

The concourse canopy essentially comprises two interconnected, arched elliptic roof structures spanning atop concrete buttress supports. The canopy includes a central glazed roof bridging the station cutting that provides natural light over the primary circulation area of the central concourse, bridging the station cutting. This aids intuitive wayfinding and orientation.

The station canopy provides shelter to the paid concourse, gateline and unpaid customer touch points within the primary plaza. The arch form of the canopy creates a strong civic identity for the station within the local community; recognisable, emblematic and providing a clear identity for Sydney Metro Northwest, in keeping with the Epping to Chatswood Rail Link stations, but of a new age. A fundamental architectural design aspiration is to express the structural dynamics of the canopy in a refined and poetic manner. The architecture consequently emerges from the engineering.

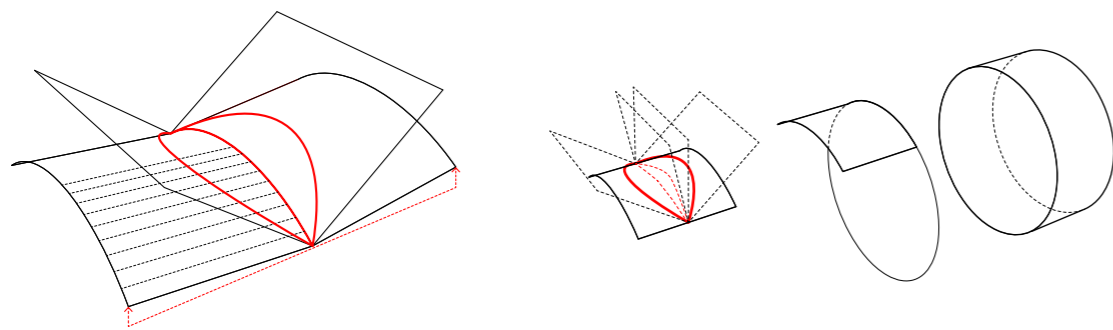


Figure 4.69_Canopy Geometry Study Source: HASSELL

Geometry

The pure geometry of the roof is derived from two equal segments of a cylinder, which have been sliced and pitched at 15 degrees towards each other.

The structural grid is derived from the pure cylindrical geometry, by extruding lines at equal spaced intervals along the inclined cylinder segment.

The two pitched roofs are then tied together via a diagrid structure, faceted on the structural grid supporting the central glazed portion of the canopy.

Design Details

The canopy is characterised by a resilient external shell in the form of a metal sheet lining, and a warm internal timber soffit that is both inviting and welcoming. Material selection and detailing has been carefully developed to ensure the finish is of a high quality, durable and robust, and easy to maintain and clean.

“A poetic expression of structure and shelter representing the unique brand of Sydney Metro Northwest.”

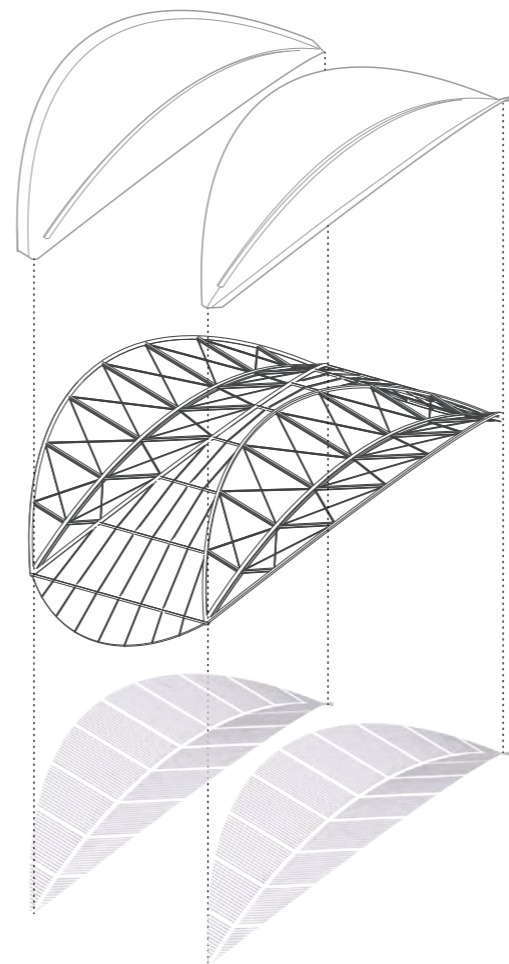


Figure 4.70_Exploded Axonometric Canopy Design. Source: HASSELL

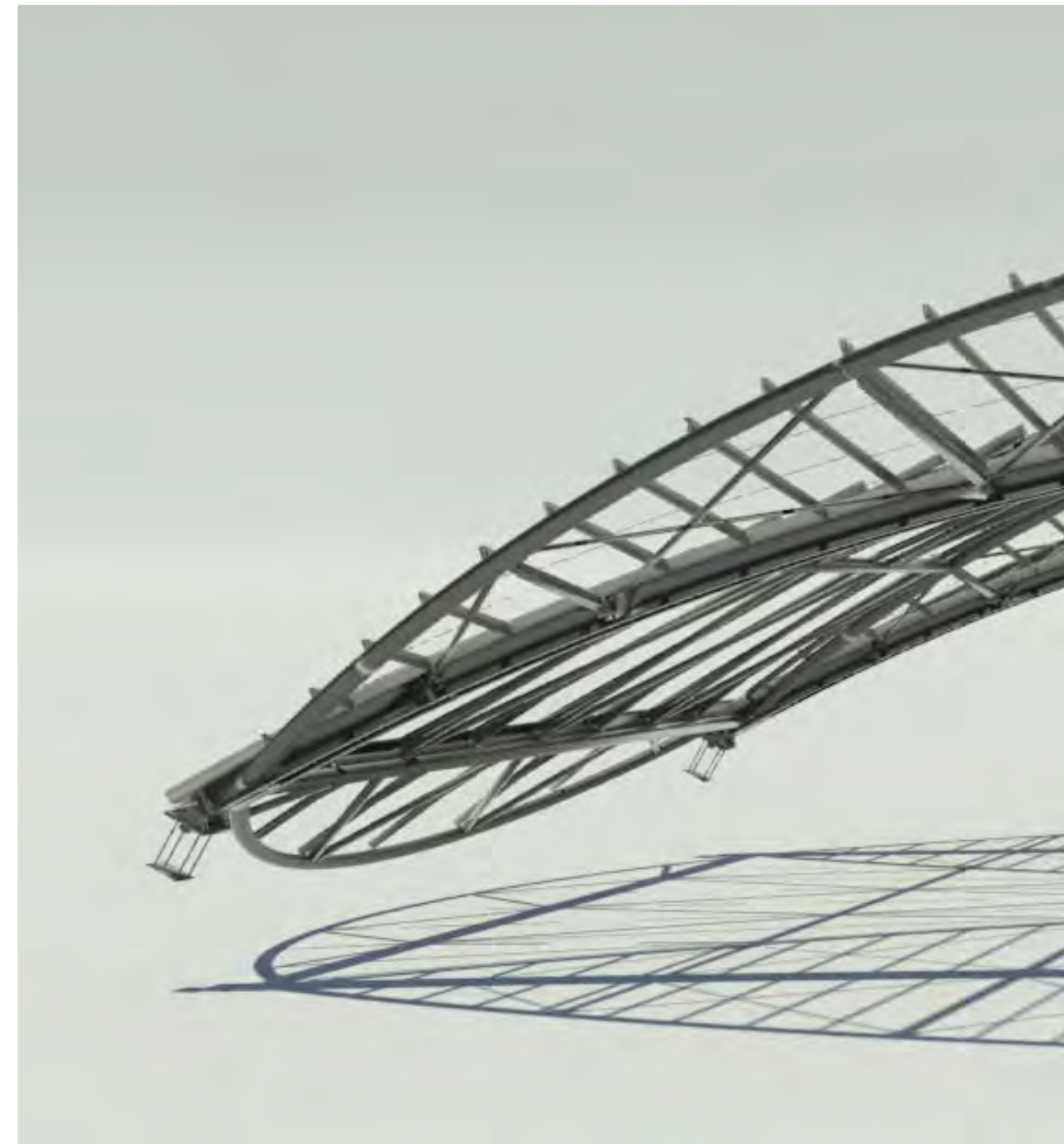
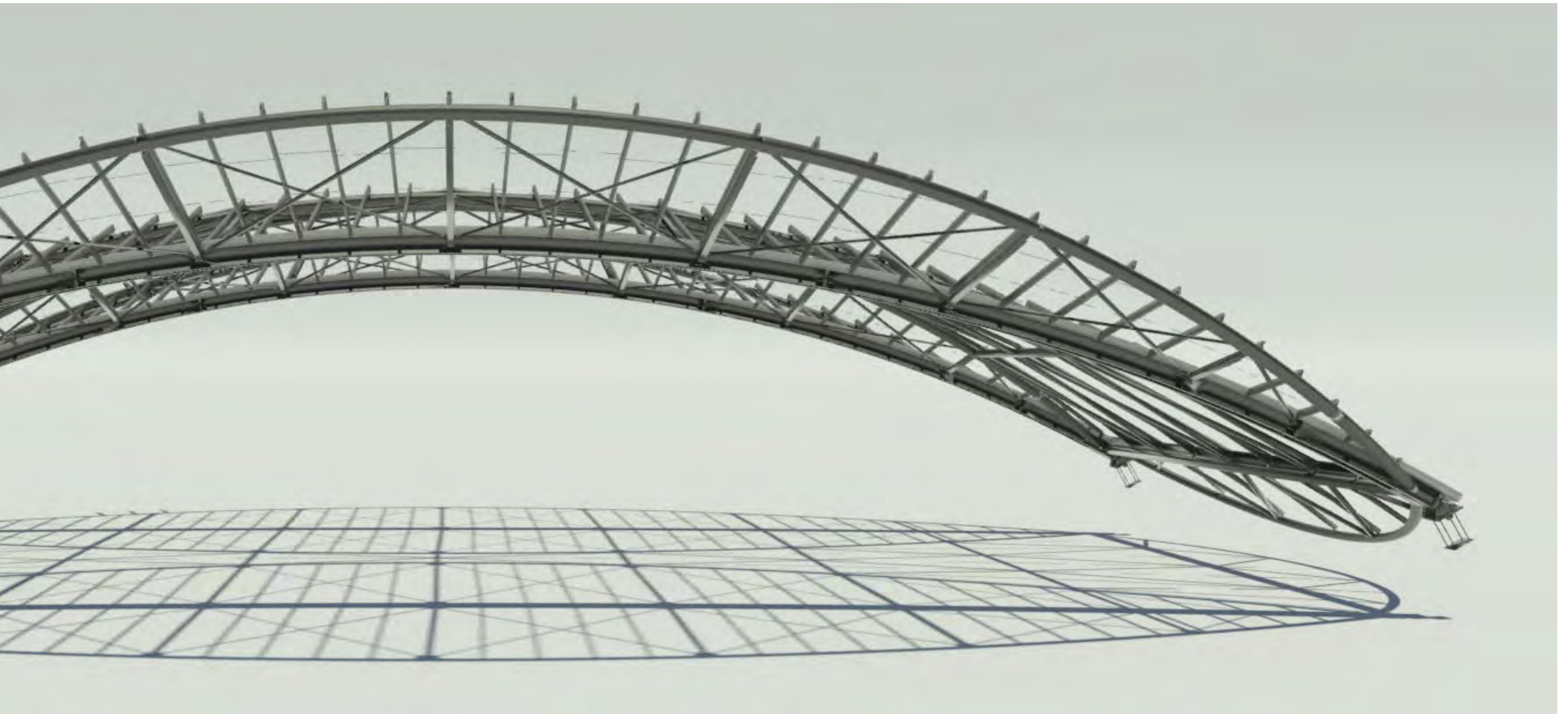


Figure 4.71_Canopy Structural Model. Source: HASSELL



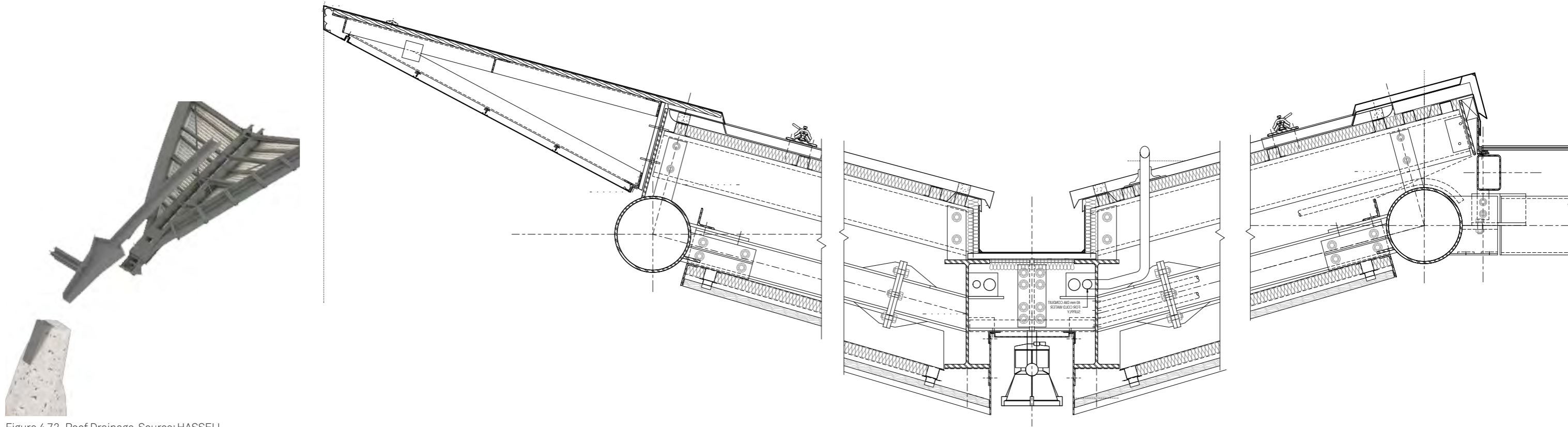


Figure 4.72_Roof Drainage. Source: HASSELL

Drainage

The flow of water off the entry canopy roof is expressed and celebrated. A central gutter assembly directs the flow of water off the canopy into a steel hopper mounted atop of a concrete buttresses that support the entire structure. Rainwater is collected from the roof for storage and re-used in the surrounding precinct landscapes where possible.



Figure 4.73_Roof Glazing. Source: HASSELL

Roof Glazing

A steel diagrid punctuates the central glazed portion of the canopy. Faceting is in line with the structural grid of the arched canopies, the glazing is held above the steel substructure via a continuous mullion system. The glazing allows direct natural daylight to penetrate down the lifts and escalators, while boosting general daylight levels of the entire concourse.

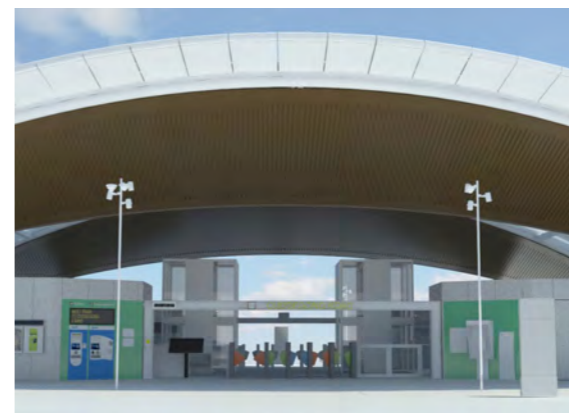


Figure 4.74_Eaves Condition. Source: HASSELL

Eaves Condition

The roof eaves project beyond the outer line of the primary structure to give the roof a defined and slender edge profile, accentuating the curved form and structural refinement of the canopy. The eaves help the canopy to provide weather protection to key customer facing features of the concourse pods such as ticketing and information displays.

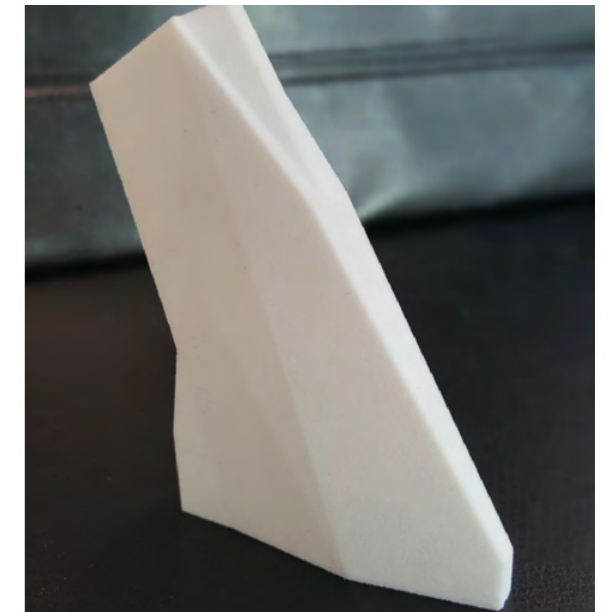
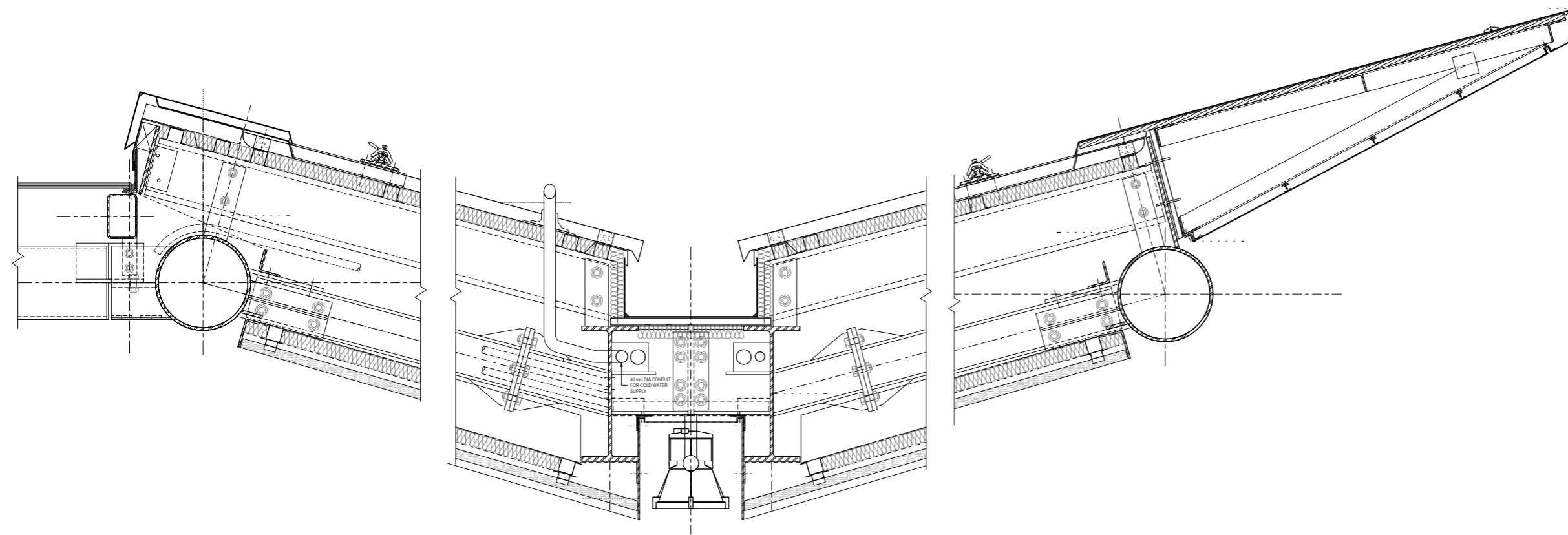


Figure 4.77_Buttreass. Source: HASSELL

Roofing System

Metal deck roofing material has been selected for the canopy to create a resilient durable external shell for the station. The metal deck roof will help manage quality of finish, consistency of colour and clear durability timelines.

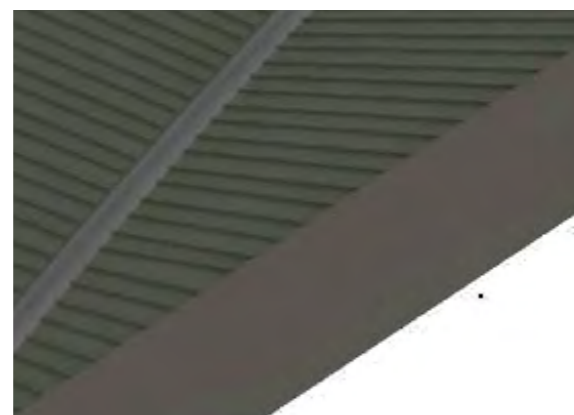


Figure 4.75_Roofing System. Source: HASSELL

Soffit Lining

Timber batten soffit linings to the entry canopy complement the arching geometry to provide a warm, safe environment to the station entrance. The slatted timber lining allows acoustic absorption to be incorporated to give a comfortable acoustic environment and ensure good speech intelligibility. The curved timber batten soffit is a signature entry gesture for the Sydney Metro Northwest project.



Figure 4.76_Timber Batten Detail. Source: HASSELL

Buttress

The main canopy structure is supported via four concrete buttresses which range in height according to their location. The buttresses are expressive of the structural forces that are pushed down into them from the canopy above. The buttress reads as an integral element to the canopy and is a key sculptural form in the plaza spaces.

4.12.4 Concourse Canopies_Open Cut

Design Intent

The concourse canopy in the open cut stations comprises two interconnected, arched elliptic roof structures spanning 48m atop concrete buttress supports. The canopy includes a central glazed roof bridging the station cutting that provides natural daylight over the primary circulation area of the central concourse. This aids intuitive wayfinding and orientation.

The arch form of the canopy provides shelter to the paid concourse, gateline and unpaid customer touch points within the primary plaza.

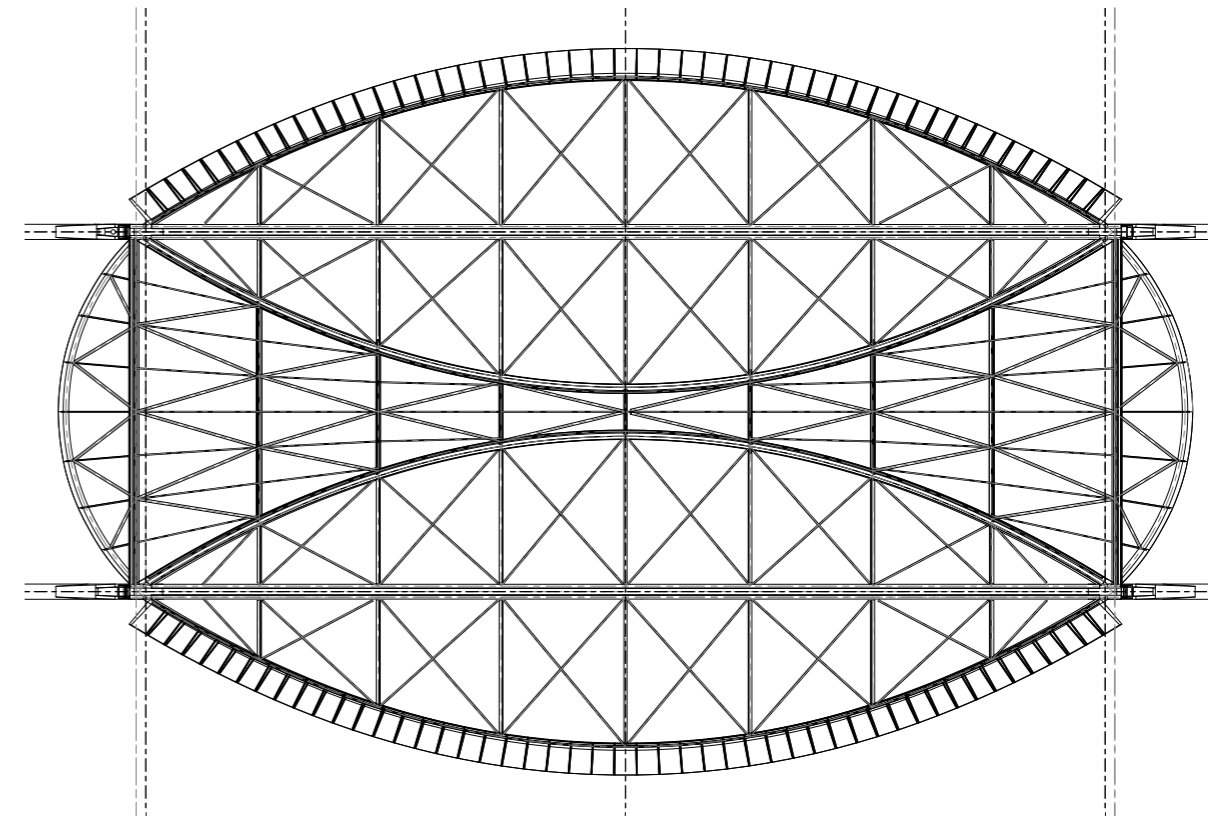


Figure 4.78_Canopy Structure Plan. Source: HASSELL

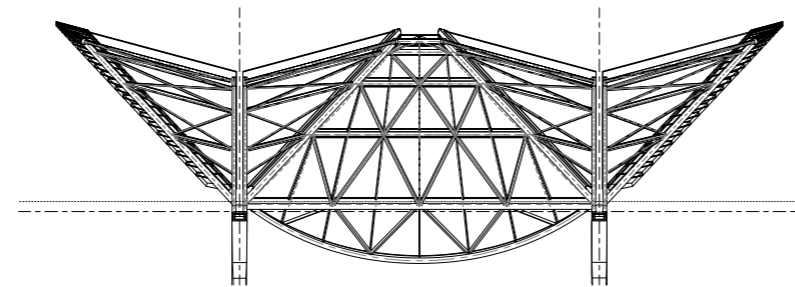


Figure 4.80_Canopy Elevation. Source: HASSELL

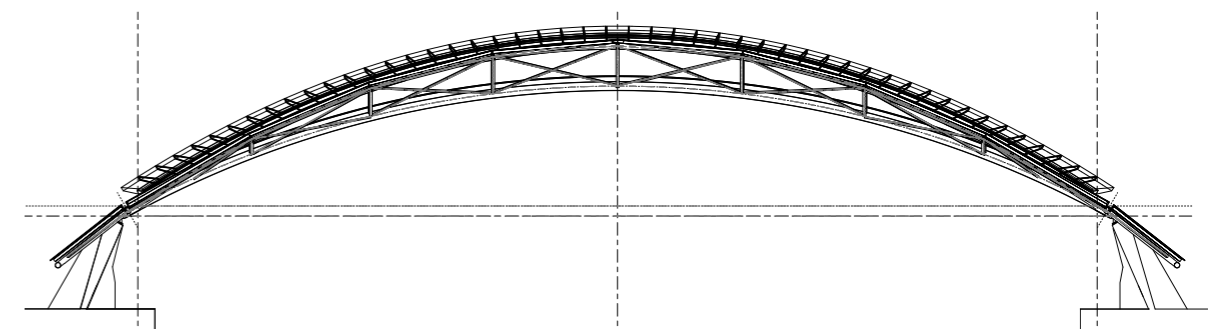


Figure 4.79_Canopy Long Section. Source: HASSELL



Figure 4.81_Open Cut Stations Canopy Design Study Visualisation. Source: HASSELL

4.12.5 Concourse Canopies_Cut and Cover

Design Intent

The main entrance canopy in the Cut and Cover stations comprises two interconnected arched elliptic roof structures spanning 36m atop concrete buttress supports. The canopy includes a central glazed roof that provides natural daylight over the primary circulation area, aiding intuitive wayfinding and orientation.

Unlike the 48m canopy, this 36m variation is placed at ground level meaning the station entrance is approachable from three sides. The inclusion of a cap in the glazed portion of the roof references this third point of entry in a similar arched language seen throughout the canopy architecture. The arch form of the canopy shelters the station entry void from weather and creates a strong civic identity for the station within the local community.

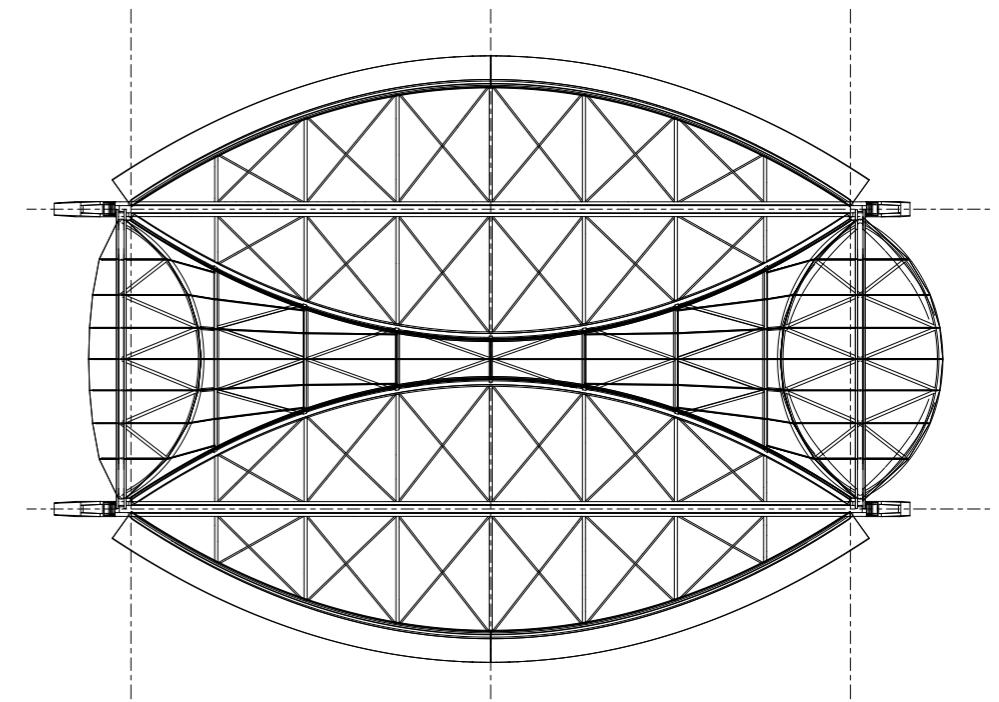


Figure 4.82_Canopy Structure Plan. Source: HASSELL

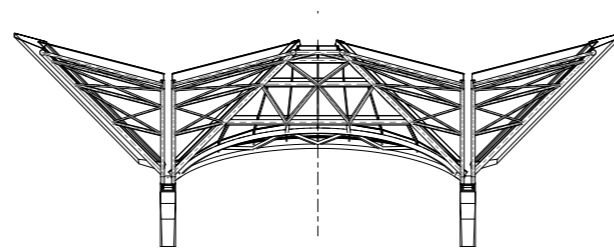


Figure 4.84_Canopy Elevation. Source: HASSELL

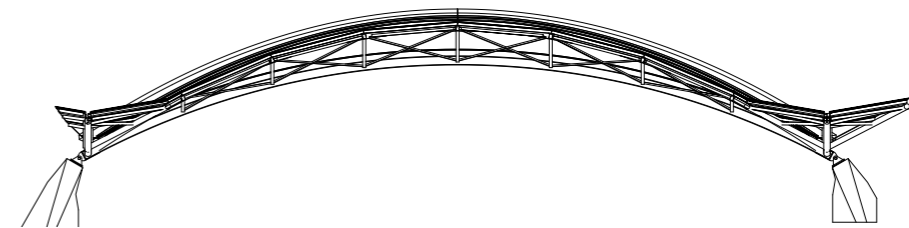


Figure 4.83_Canopy Long Section. Source: HASSELL

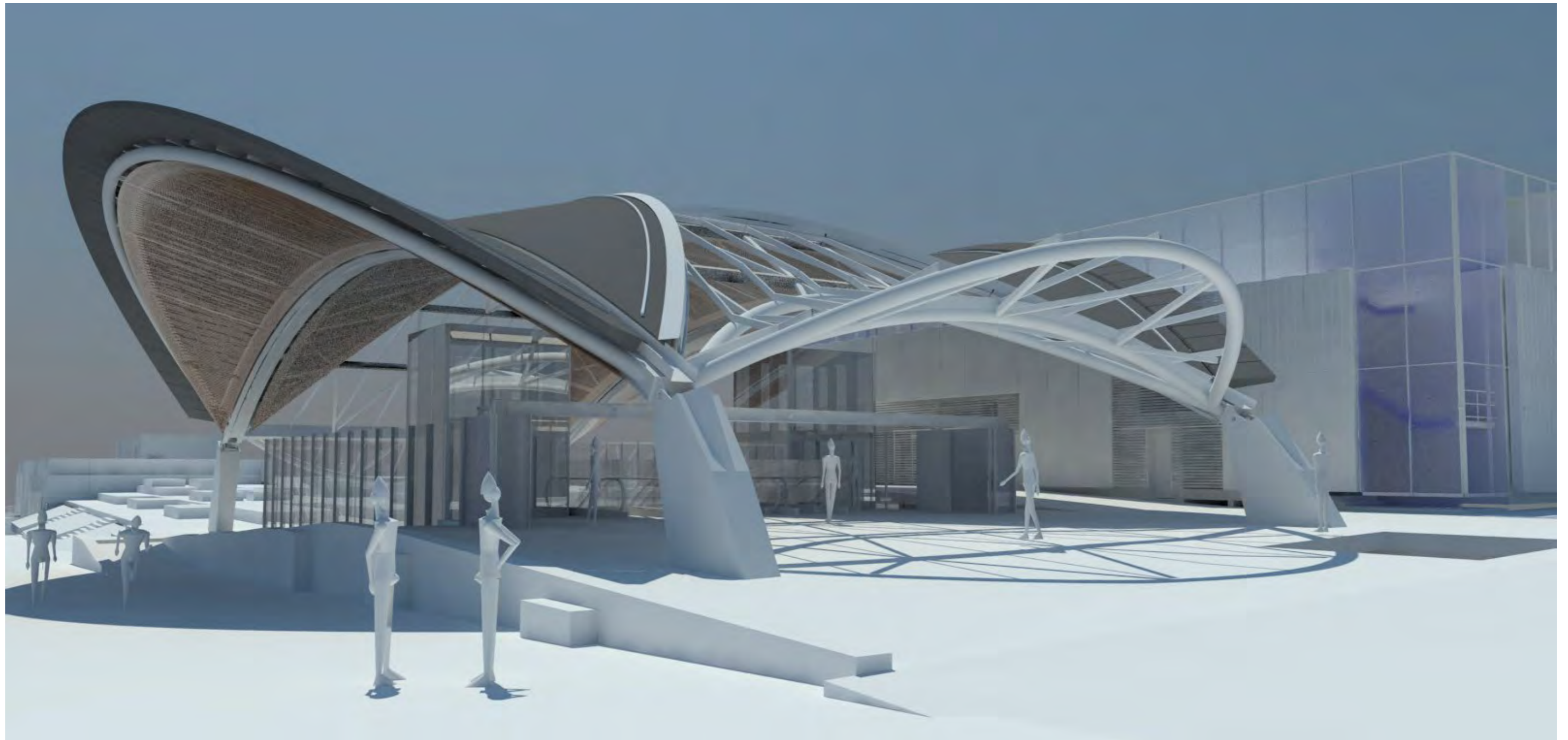


Figure 4.85_Cut and Cover Stations Canopy Design Study Visualisation. Source: HASSELL

4.12.6 Concourse Canopies_Elevated Stations

Design Intent

The entrance canopy is a single roof structure comprised of sections that project in four directions to respond to the four key directions of movement across the primary plaza.

It appears “slung” underneath the viaduct, referencing the curved language of the canopies established at the other stations. The structural curve combined with the timber soffit identify the entrance plaza and also reinforce the line wide identity developed through the canopies for both the ‘Open Cut’ and ‘Cut and Cover’ typologies.

The entrance canopy employs four single curvature surfaces that intersect each other as they slope inwards towards a column structure holding the canopy in tension. The entrance canopy has a height of 5m above the concourse and up to 7.5m on the outer edge.

The entry canopy provides shelter and weather protection to the paid concourse, gateline and unpaid customer touch points within the primary plaza.

The station entry canopy aligns with the intersection of key precinct streets. A landmark seen from a distance, a strong civic identity for the station within the local community.

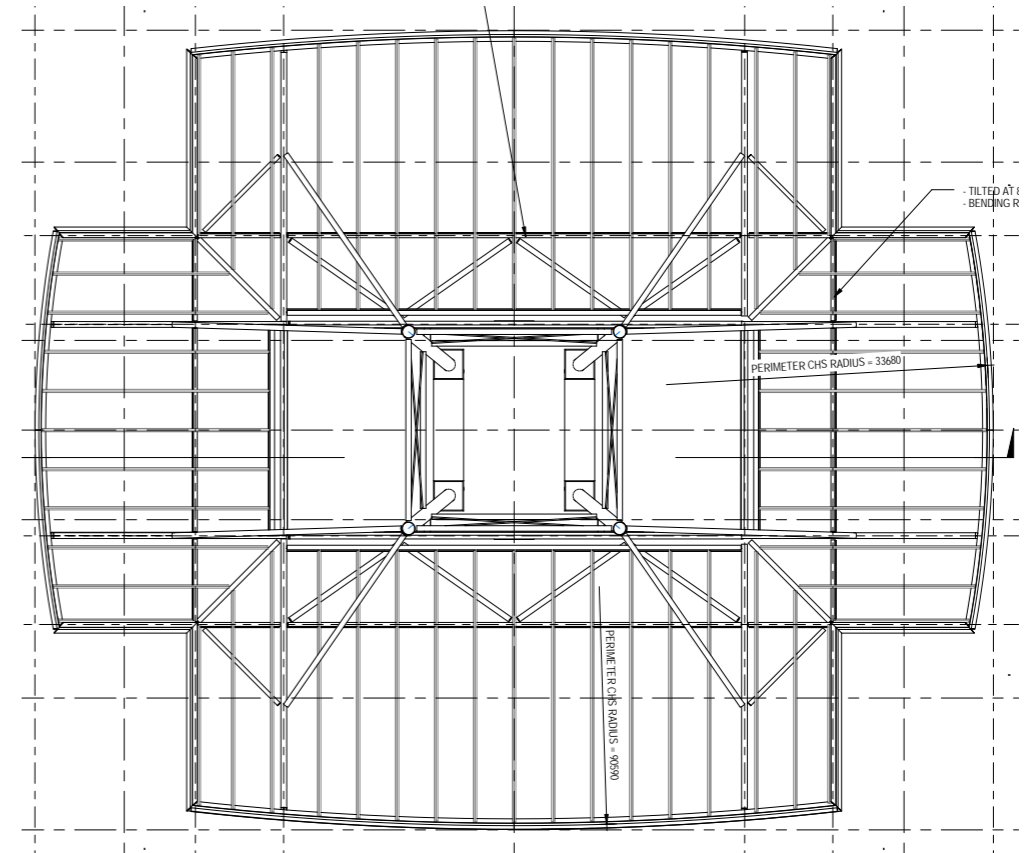


Figure 4.86_Canopy Structure Plan. Source: HASSELL

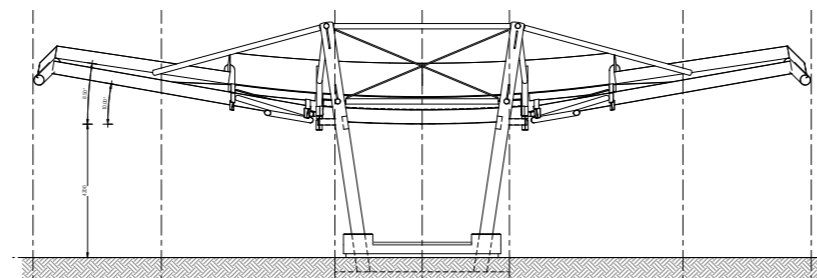


Figure 4.88_Canopy Elevation. Source: HASSELL

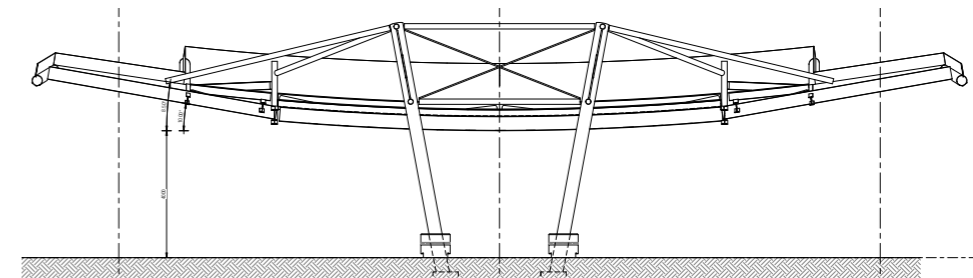


Figure 4.87_Canopy Elevation. Source: HASSELL

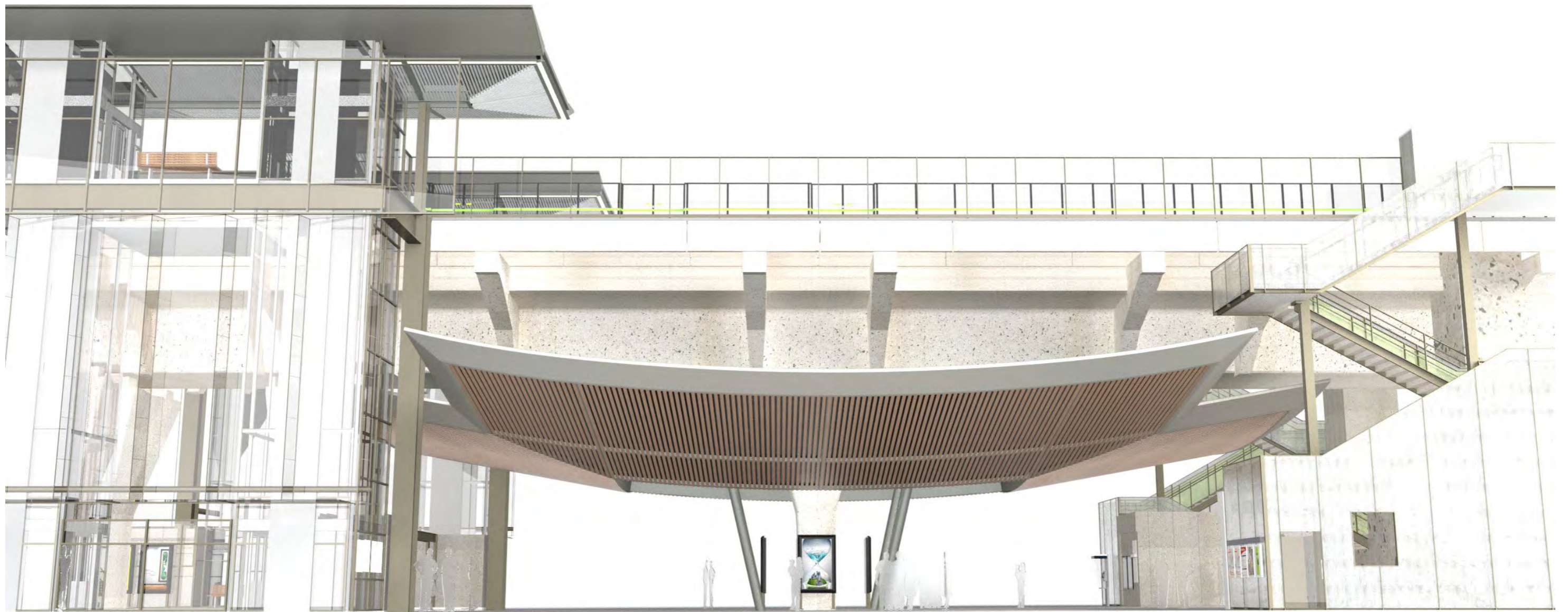


Figure 4.89_Elevated Stations Canopy Design Study Visualisation Source: HASSELL

4.12.7 Platform

Design Intent

The station platforms are generally 168m long with full height platform screen doors along the full length of the platform. Escalators and lifts are located on the platform to provide an even distribution of customers to the platform level.

The platform is simple, muted and minimalist in its design and material palette. The paving materials will be robust and ubiquitous. The surface will present itself as a singular plane by not highlighting joints between pavers.

Passenger information displays (PIDs) will be strategically placed on the platform for optimal viewing from any location on the platform.

“A simple, calm, recognisable experience balancing efficient egress with areas of pause.”

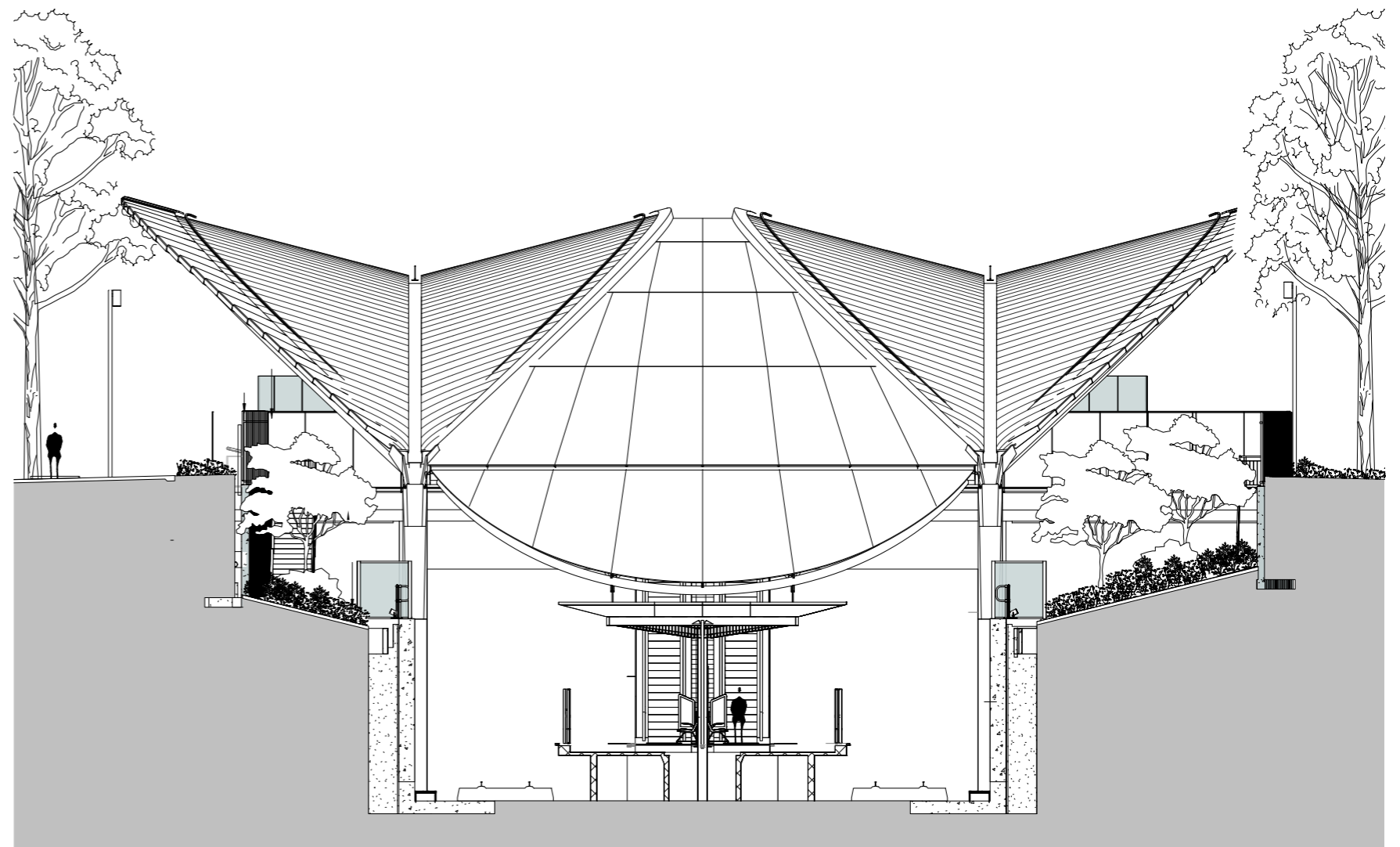


Figure 4.90_Open Cut Station Platform Section showing Layout and Relationship to surrounding Precinct. Source: HASSELL

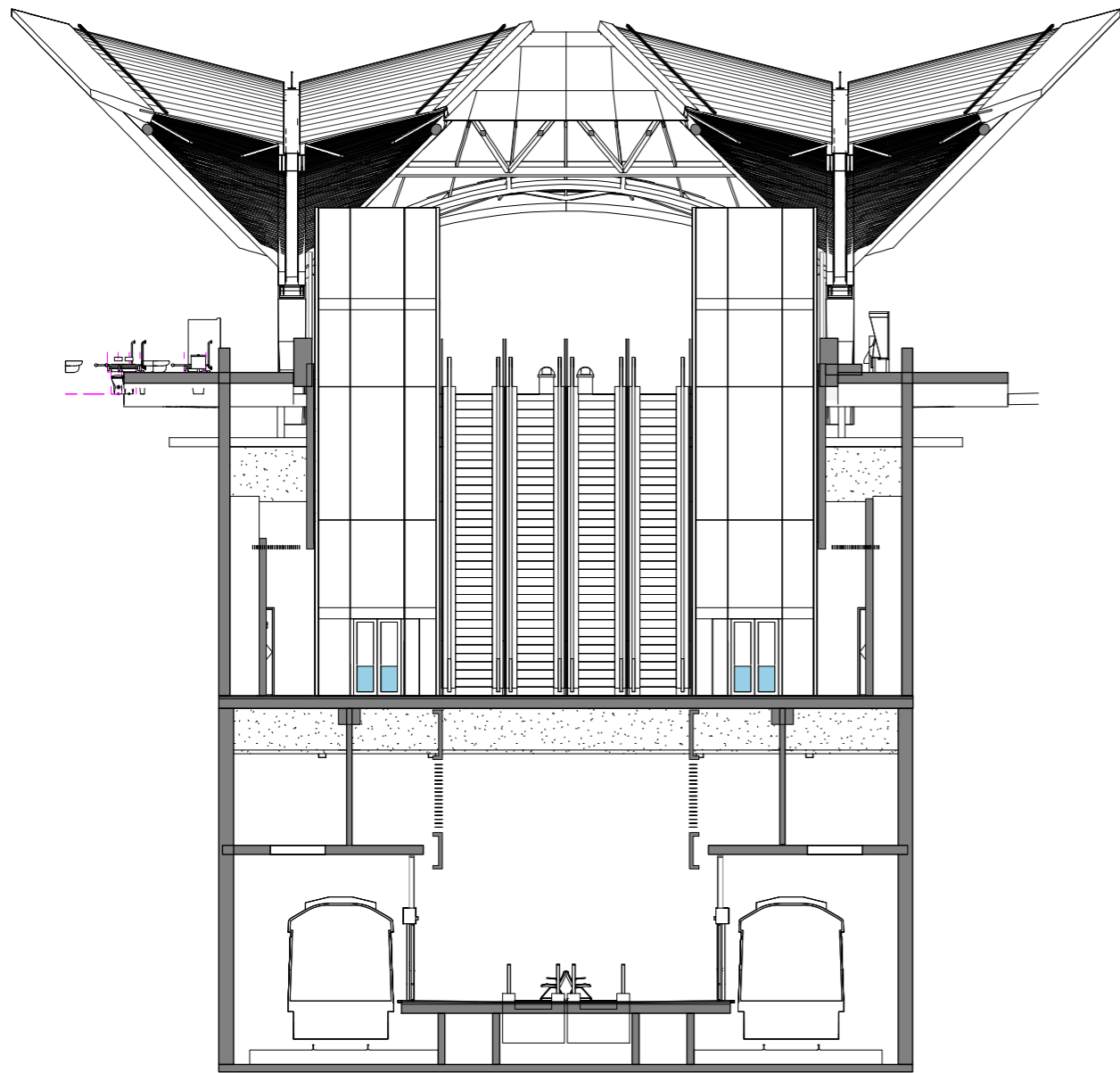


Figure 4.91_Cut and Cover Station Platform Section showing Layout and Relationship to surrounding Precinct. Source: HASSELL

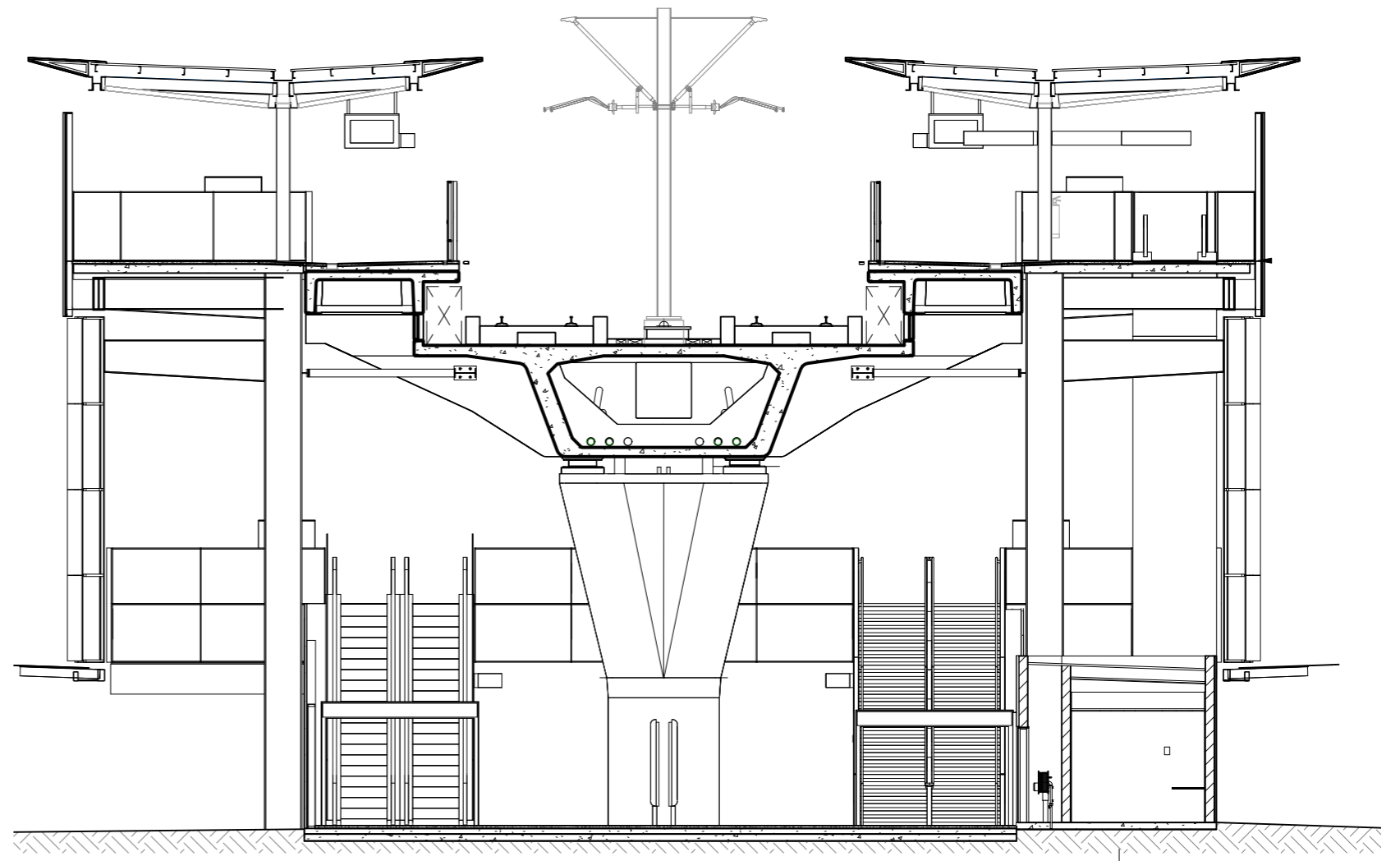


Figure 4.92_Elevated Station Platform Section showing Layout and Relationship to surrounding Precinct. Source: HASSELL

4.12.8 Platform Canopies_Elevated Stations

Design Intent

The platform canopy is simple in form and designed to read as a relative of the entry canopies in materiality and detail. This reinforces line wide design coherence and the kit of parts strategy adopted for system wide elements.

The aluminium baffle soffit is designed to express the cantilever structure transitioning from a solid central zone to a thin outer edge. The structural grid is expressed in the soffit which is bounded by the services channel. The services channel is read as a continuous line along the platform edge to house lighting, CCTV, platform information displays and public announcement systems. The services channel combined with the soffit treatment work to reinforce a strong linear nature to the platform.

The platform canopy provides customers with weather protection from rain and direct sunlight. Columns are spaced at 12m centres to free the platform as much as possible from physical obstructions and clutter.

Where the platform canopy continues under the entrance canopy and station concourse the platform canopy becomes legible via the continuous services channel, which sails past the escalators and lifts without impeding the function of the vertical transport and maintaining operational amenity for the platform area.

The also continuous services spine is in the optimum location without interrupting the soffit lining, housing the necessary power and communications services for LED strip lighting, closed circuit television (CCTV) and public announcement (PA) systems.

“A line wide platform canopy: simple, expressing its cantilever and the linear nature of the platform.”



Figure 4.94_Platform Canopy Design Study Perspective. Source: HASSELL

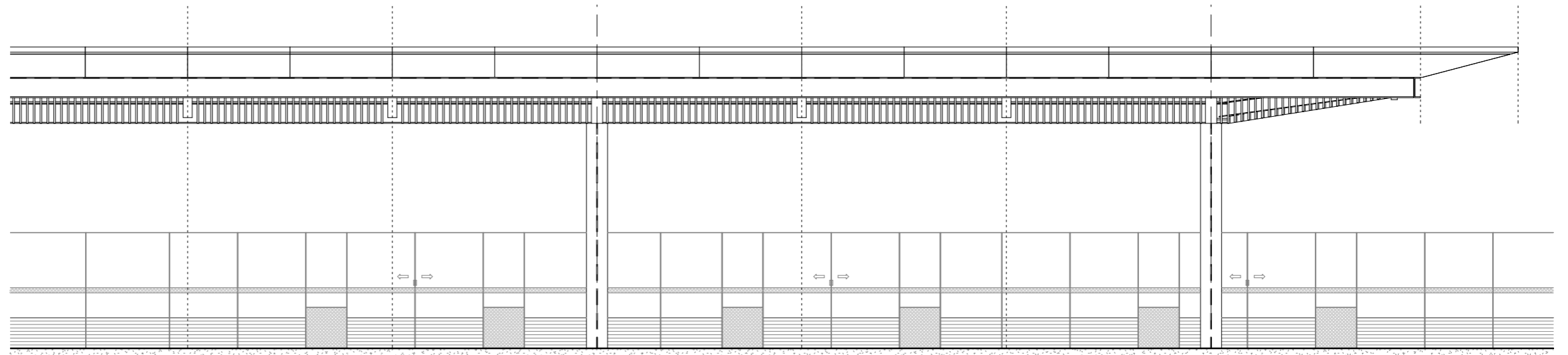


Figure 4.93_Platform Canopy Long Elevation. Source: HASSELL

4.12.9 Service Buildings

Design Intent

A general design strategy for the service buildings has been developed to give them an ordered architectural hierarchy. Service buildings within the station precinct and cutting are 'of the landscape', they are rougher and grittier in finish and subordinate rather than pronounced.

For the design of the service buildings, a precast concrete outer cladding is set proud of a metal cladding layer which is used to sleeve openings for doors, louvres, advertising panels or signage and enclose any rooftop plant or services. The depth between the face of the concrete and the metal sheet gives the service buildings relief and shadow.

Where precinct bike enclosures, community facilities or future retail pods are required, a perforated or solid metal sheet cladding can be used as a 'slide out' constituent of the concrete box where a more open and customer friendly material is appropriate. This concept allows future growth and adaptation of the precinct pods as necessary.

“A gradational ‘rough’ of the landscape to ‘smooth’ of the station’s user interface.”

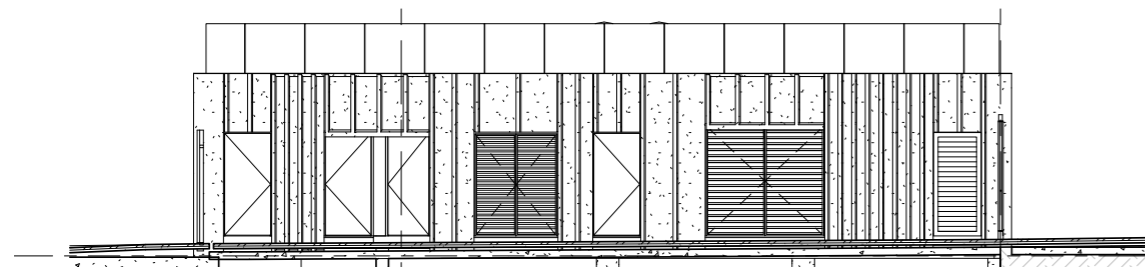


Figure 4.95_Service building elevation. Source: HASSELL



Figure 4.96_Artist Impression of Service Building at Cherrybrook Station. Source: Ai3D.

4.12.10 Concourse Pods

Design Intent

Pods in the station concourse areas containing customer touch points and services are more prominent than the services buildings, making them more inviting with tactile, colourful finishes.

Vertical steel panelling is used to clad the pods, typically with a neutral dark grey hue in keeping with other materials and finishes. At customer touch points the steel skin peels away to reveal a glossy internal surface finished in the station accent colour. This attracts customer attention and imparts intuitive interaction with the concourse space for all patrons.

The concourse pods contain many of the station amenities such as bathroom facilities, information displays, station management rooms, ATM's and vending machines, forming an integral part of the customer experience.

The concourse canopy helps to provide weather protection to the pods below helping customers stay dry as they engage with core station information and services.

The shape of the pod reinforces circulation paths on the concourse. Pod faces containing ticket machines are angled towards the gateline while the form provides spaces for pausing away from the main circulation paths on the paid concourse.

“Sculptural moves enacted on the form - ‘Fold’, ‘Peel’ and ‘Punch’.”

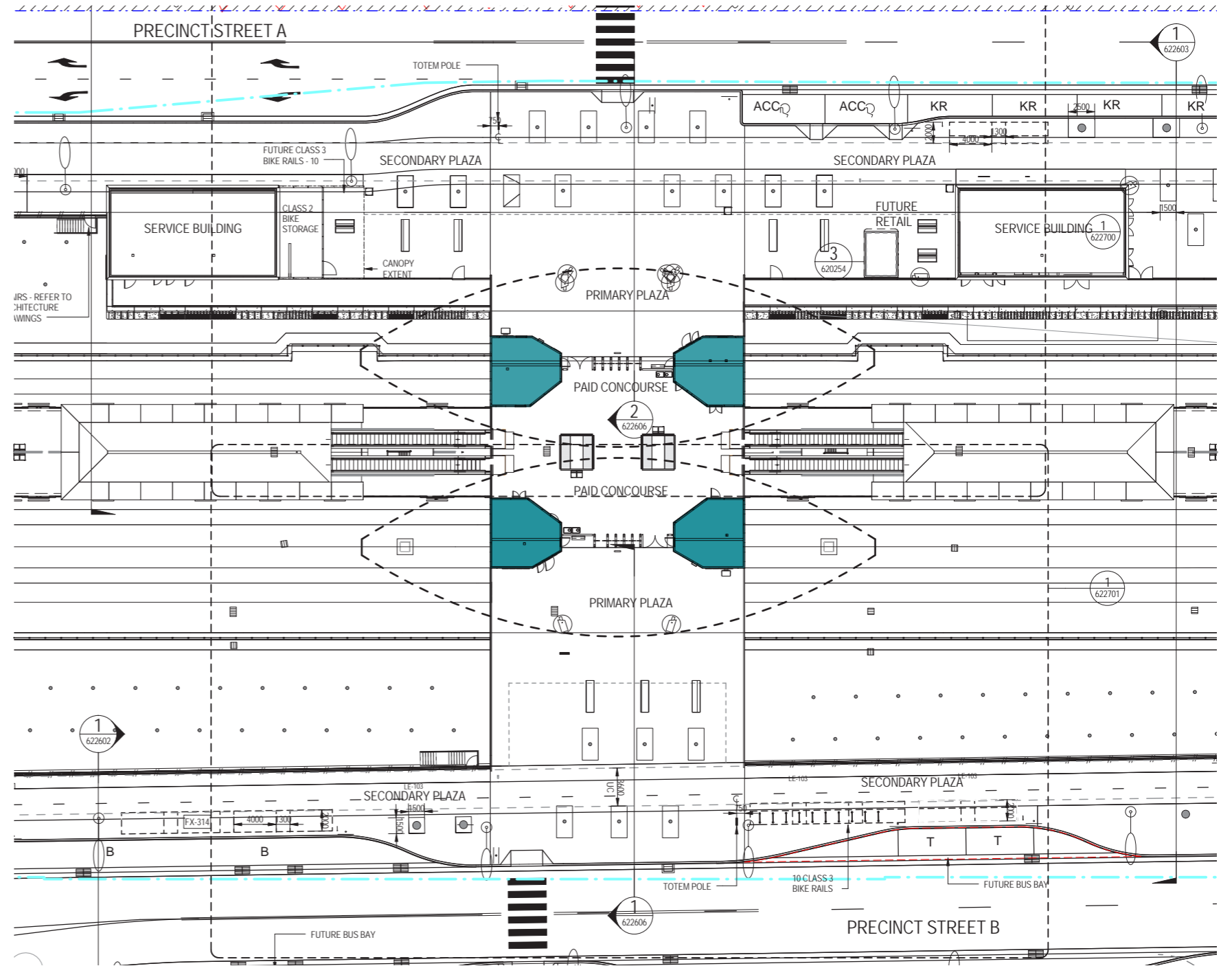


Figure 4.97_Location of Concourse Pods in Primary Plaza and Paid Concourse. Source: HASSELL

4.12.11 Vertical Transportation

Design Intent

To optimise intuitive wayfinding, the vertical transportation uses the station accent colour as illustrated on the diagrams opposite. The consistent use of coloured glass accents emphasise their conception as a family of elements distributed across the stations.

While aiding intuitive wayfinding through instant recognition, the coloured glazing used on the vertical transport animates the station environment by casting coloured light onto station surfaces when lit either by sunlight or via artificial lighting.

Subdued, durable materials and colours have been selected for the remaining elements in the vertical transport suite. Simplicity and legibility are core design drivers.

“A calm and uncluttered, quiet experience with a controlled use of an accent colour to reinforce wayfinding and station identity.”

Lifts

Lifts provide access for passengers with mobility impairments. Two lifts are provided, increasing passenger capacity and reliability of lift availability to benefit all passengers. Lifts provide DDA compliant vertical transport between all public areas of stations.

Lifts also provide maintenance and service access to public levels to facilitate movement of cleaning and maintenance equipment such as floor cleaning machines and scissor lifts.

In cut and cover stations lifts serve plant levels to provide service access and allow easy movement of maintenance equipment and materials.

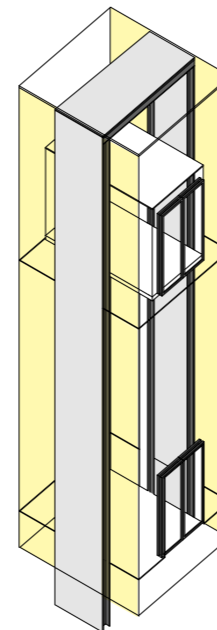


Figure 4.98_Lift accent colour in glazing. Source: HASSELL

Stairs

Stairs are an essential, easily identified and understood vertical transport option for passengers. A gentle incline with regular landings for rest has been designed.

The concrete finish of the stairs is in keeping with the material palette, while slip resistance and contrast is bolstered via articulated nosings on the treads.

Glazed screens on each side of the stairs provide stability for users and are coloured in the station accent colour

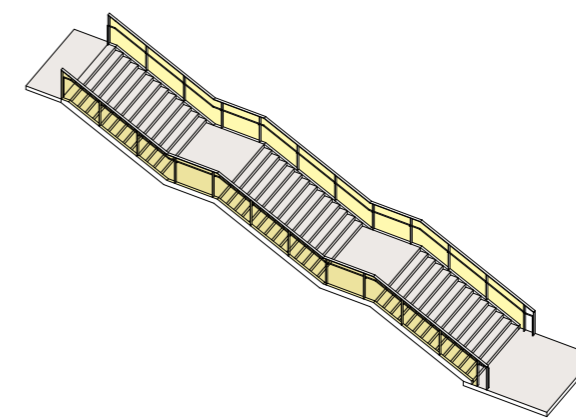


Figure 4.99_Stair accent colour in glazing. Source: HASSELL

Escalators

Escalators provide comfortable and efficient vertical transport for passengers between all public levels at NRT stations. The proposed travel speed is 0.65m/s.

Escalators provide efficient passenger handling with predicable passenger capacity. Directional operation allows control of passenger flows.

Hibernation mode allows escalators to reduce to a slow speed in times of low demand to minimise energy consumption.

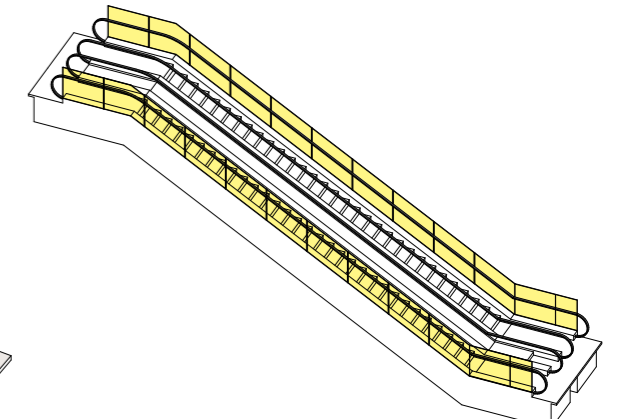


Figure 4.100_Escalator accent colour in glazing. Source: HASSELL

4.12.12 Screens, Balustrades and Fences

Design Intent

A variety of screens, balustrades and fences required to deliver the necessary security, system and performance requirements. Adopting a system wide design approach, to consolidate the number, look and feel of these to a minimum to give the architecture and landscape architecture homogeneity, order and consistency across all stations, precincts and the wider rail corridor.

The design employs a refined strategy for screens, balustrades and fences, based on a finely detailed framed steel plate system.

This restrained approach is echoed throughout with general fixtures and finishes lending a calm and ordered hierarchy within each station and precinct. Subtle use of an accent colour for customer touch points and circulation cues is augmented by the prevalent quiet and minimalist architecture.

A modular system comprising primary vertical stainless steel flats at 1.5m or 3m centres is proposed, allowing glass, mesh and palisade style fins to be used as and where applicable. A canted option for pedestrian bridges has been adopted to maximise the openness.

Stainless steel handrails are proposed. Where used as an aid to wayfinding, a coloured enamel steel may be used to tie in with the customer touch point finishes.

“A dynamic transparent skin which articulates the spaces behind, is modular and responds to movement.”

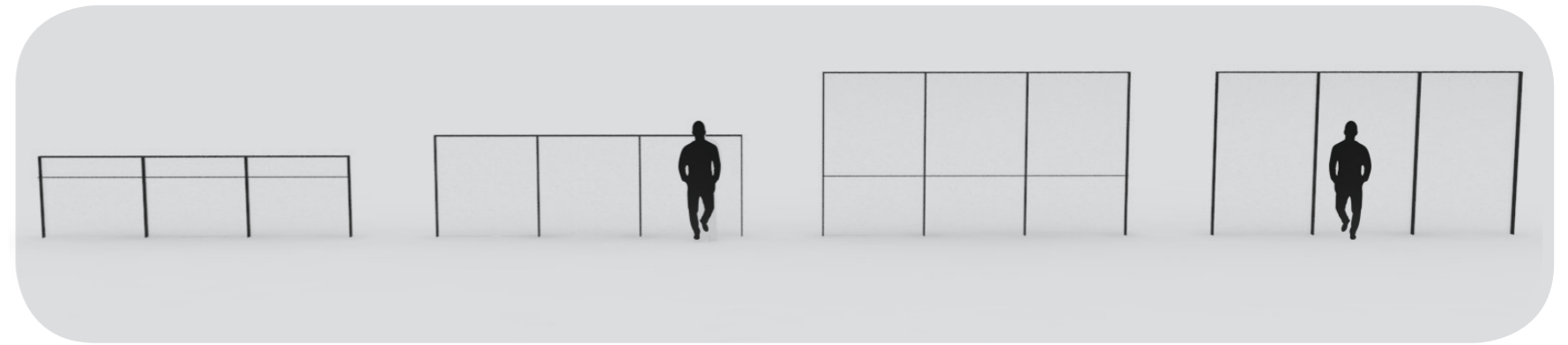


Figure 4.101_Screens, Balustrades and Fences Design Study. Source: HASSELL

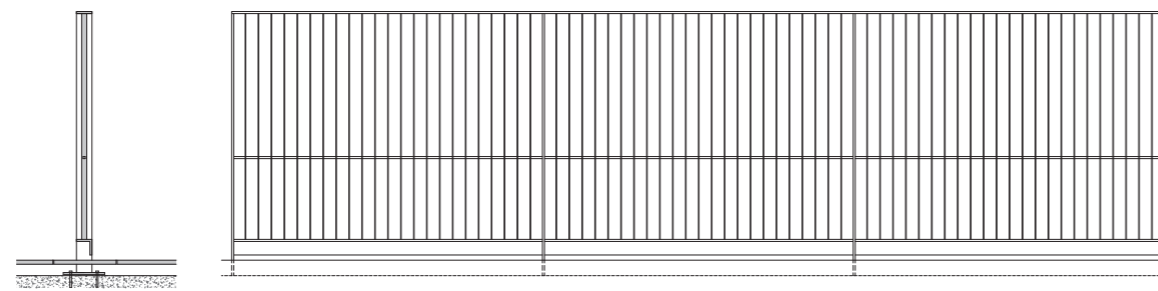


Figure 4.102_Pallisade Fence Design. Source: HASSELL

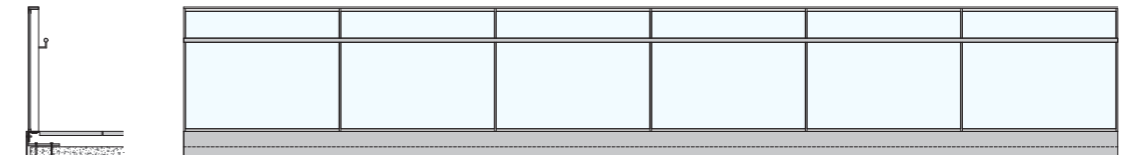


Figure 4.104_Balustrade Design. Source: HASSELL

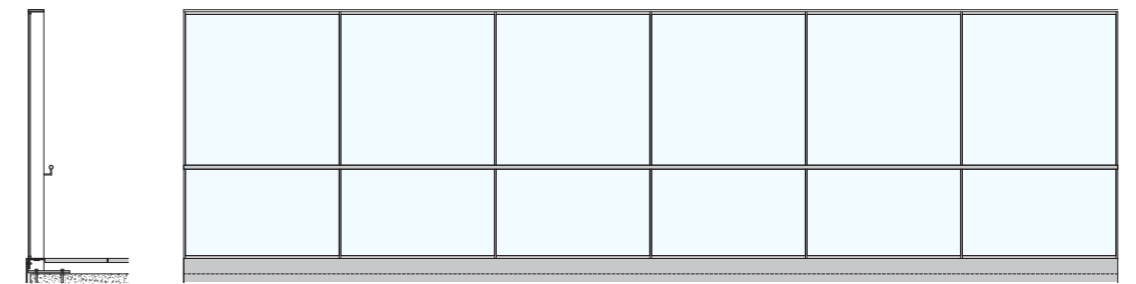


Figure 4.103_Security Screen Design. Source: HASSELL

4.12.13 Facades

Design Intent

The facade on elevated stations is highly visible and plays a key role in defining the character of the typology and the surrounding precinct. The platform canopy is expressed as a cap to the elevation and therefore the articulation of the facade and platform canopy are closely linked.

The facade is expressed as a simple glazed sawtooth geometry. It opens up along its length expressing the movement to and from the station. Through the form and the integration of coloured glazing as part of the Public Art Plan, it will cast texture, light and colour through to both the station concourse and the public domain of the wider precinct.

The facade is constructed in regular, repeated 2m bays which respond to the structural grid and rhythm of the station. A clear change can be seen as the facade rises up to platform level. A clean long section of the facade can be seen to step out from the sawtooth below referencing the changed nature of movement experienced at the platform level.

The facade design provides customers in the station with light and weather protection while also allowing for air flow through the station.

“A dynamic transparent skin which articulates the spaces behind, is modular and responds to movement.”



Figure 4.107_Rouse Hill Facade Elevation. Source: MWA with T + C Studio

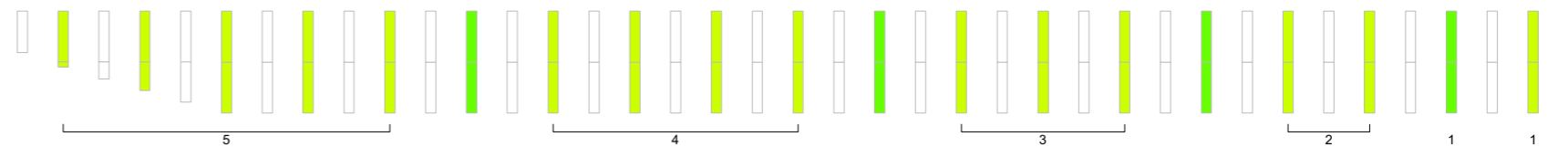


Figure 4.105_Rouse Hill Facade Coloured Glazing. Source: MWA with T + C Studio

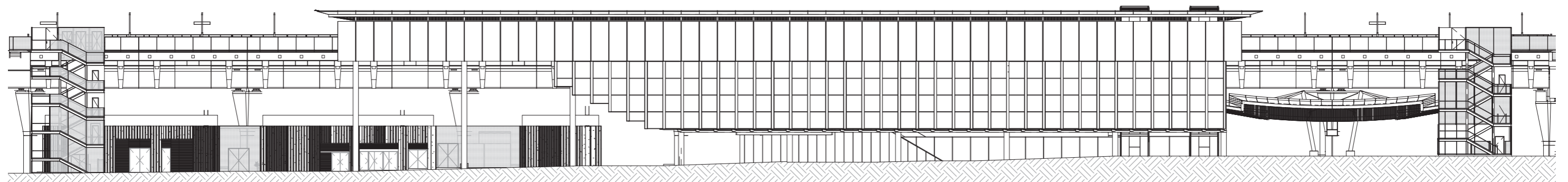


Figure 4.106_Rouse Hill Elevation . Source: HASSELL

4.12.14 Subway

Design Intent

The subway tunnel will provide a memorable experience in the sequence of spaces through the station. It is expressed as an in between space contrasting to the station and entry boxes at each end.

Its materiality and design will accentuate movement and flow, illuminated and reflecting the station specific colour, it will form a unique entry experience for customers arriving from nearby developments.

While the tunnel forms a key access route in Norwest Station, the second entry canopy at Norwest station is a temporary design item which may be replaced by potential future development, which will take advantage of sub-terranean access to the station.

“A memorable pedestrian experience, an in between space contrasting to the materiality of the station box and expressing movement and flow.”

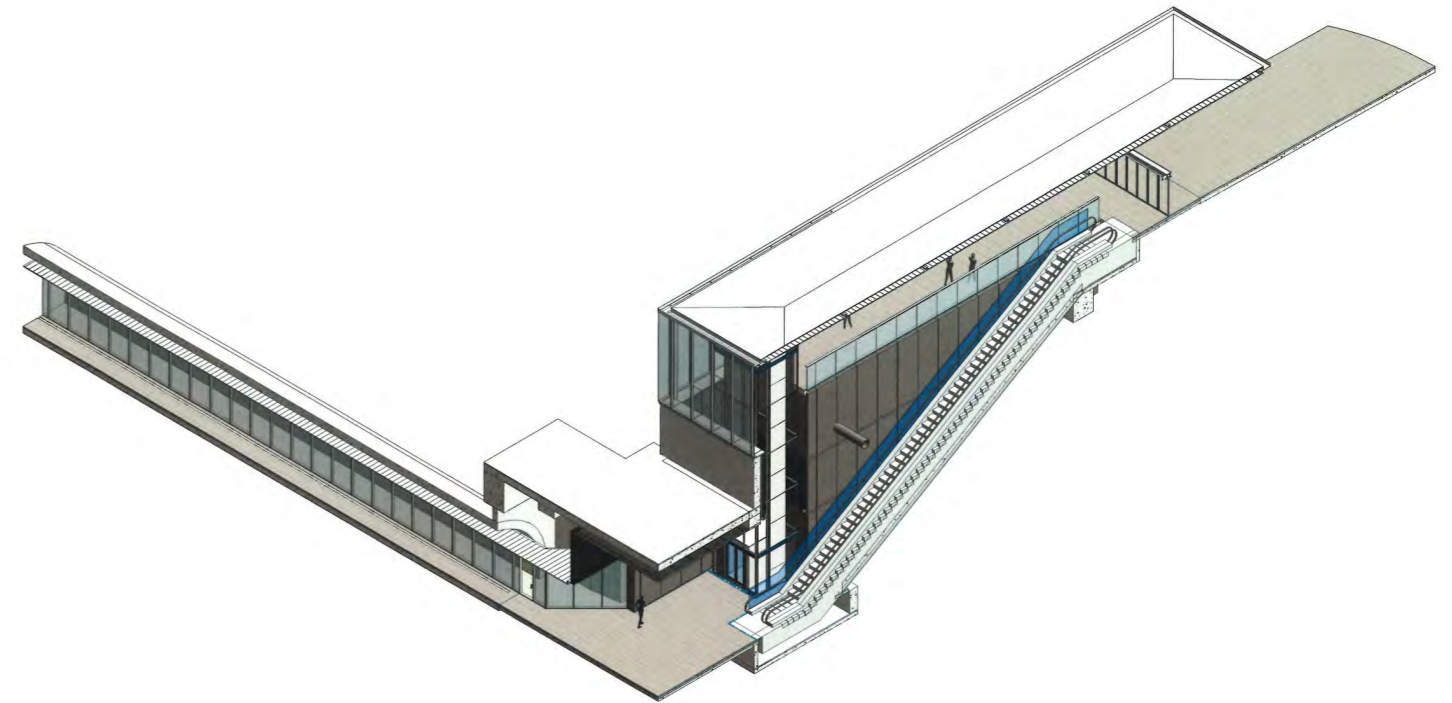


Figure 4.109_Subway Axonometric. Source: HASSELL

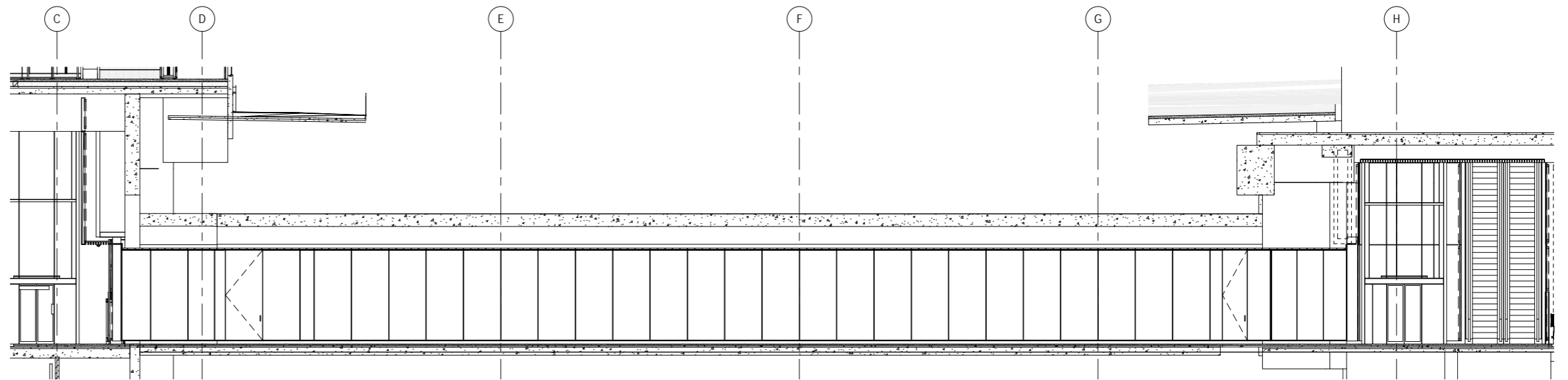


Figure 4.108_Subway Concourse Long Section. Source: HASSELL

4.12.15 Multi Level Car Park

Design Intent

The car park is to be enveloped in hardwood timber batten facade system which varies in density in response to the internal layout of the car park.

Vertical timber battens are spaced at wider centres at points relative to the avenues within the car park to allow greater light penetration and transparency.

The entrance portal is open and inviting at ground level. The lift and stair enclosure is extruded through the facade to provide a visual beacon for pedestrians approaching the car park.

The vertical transportation cores are consistent with the system wide design strategy incorporating the station accent colour to assist intuitive wayfinding.

Planting surrounding the car park comprises low planting and trees with clear trunks to avoid potential concealment areas adjacent to the pedestrian paths. Consequently the landscaping buffer will not screen views of the car park and vehicles from the surrounding streets and precinct.

“A dynamic transparent skin which articulates the spaces behind, is modular and responds to movement.”



Figure 4.110_Artist Visualisation of Multi Level Car Park at Cherrybrook. Source: Ai3D.

4.12.16 Pedestrian Bridges

Design Intent

To minimise visual impact, the vertical transport elements of the overpass pedestrian bridge are clustered together and harmoniously enveloped using a perforated mesh screen, presenting opportunities for integrated public art or super graphics.

A floating canopy roof is proposed over the bridge in keeping with the platform and bus shelter canopy design.

The structural solution is a walk through truss with two supporting fin walls. The structural truss is expressed through the translucent anti-throw screens.

A switchback stair arrangement has been adopted. At the upper level the stair is fully enclosed by the screen mesh, and as it descends the screen begins to peel away and the stair becomes more open.

The vertical transportation is consistently highlighted using the station accent colour.

“A grouping of the component parts to provide simplicity, a calm and uncluttered experience, three elements unified by a common material.”



Figure 4.111_Pedestrian Bridge Perspective. Source: HASSELL

4.12.17 Skylight Lanterns

Design Intent

The skylights are a key design element for the underground stations, providing natural light onto the paid concourse and vertical transportation areas.

They form a key part of the Public Art Plan creating sculptural elements in the station plazas and casting kaleidoscopic effects to the station interior.

Sunlight is captured and refracted within the skylight casting coloured light down into the concourse below. The coloured light can be seen to move across the interior surfaces of the station throughout the day, creating an dynamic station concourse environment.

Trees will be visible through the skylights, connecting the landscape to the interior of the underground stations. At night the skylights are illuminated to become glowing lanterns in the landscape setting.

The skylights are able to be used for seating and are kept at a low level to become discrete landscape elements that compliment the plaza composition.

“An enhanced day lighting component that provides intrigue and delight, day and night”



Figure 4.116_Pedestrian Bridge Perspective. Source: HASSELL

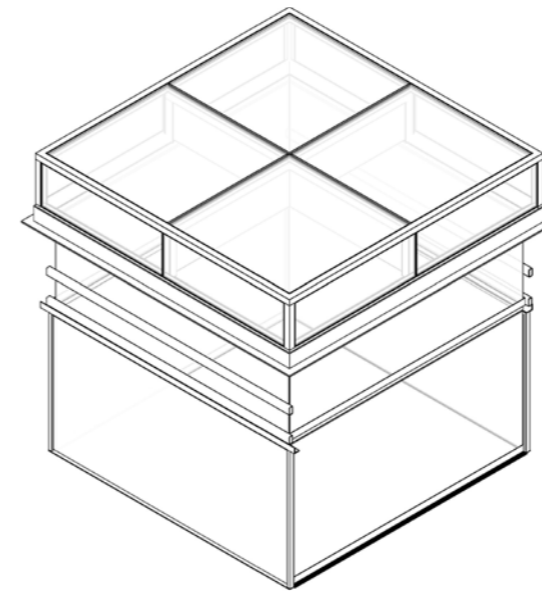


Figure 4.112_Skylight Axonometric View. Source: HASSELL

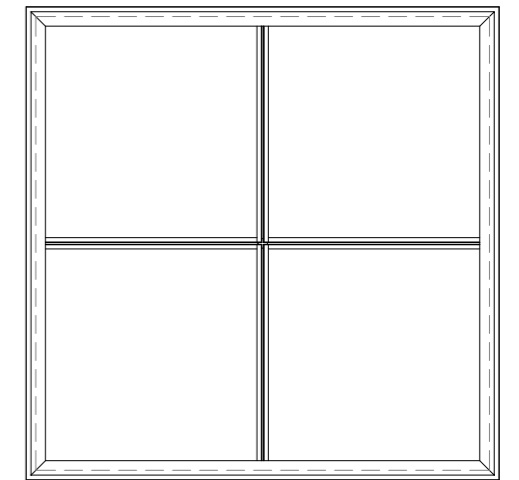


Figure 4.114_Skylight Plan. Source: HASSELL

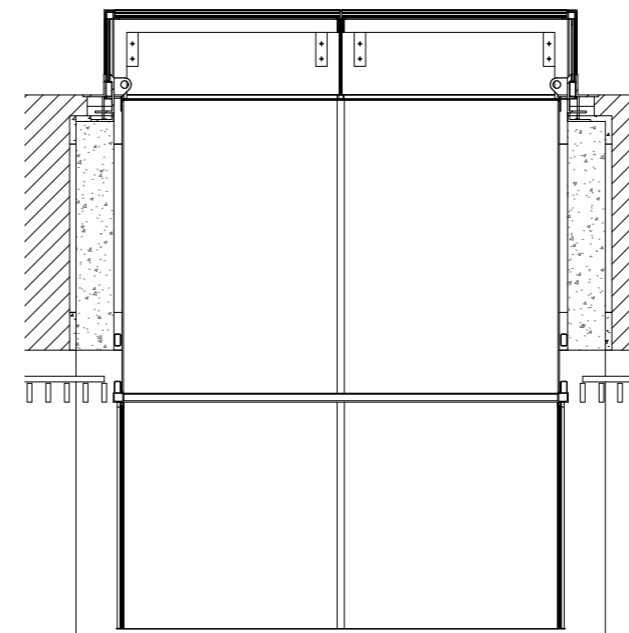


Figure 4.113_Skylight Cross Section. Source: HASSELL

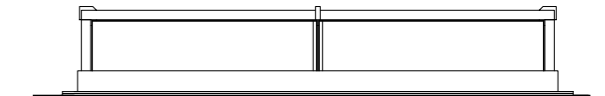


Figure 4.115_Skylight Elevation. Source: HASSELL

4.12.18 Lighting

Lighting Strategy

The lighting for all stations will be fully integrated with the Station’s architectural and landscape design. The lighting design considers the overall journey to ensure a visually comfortable and consistent experience throughout. The public’s perception of safety will be paramount.

In addition, the lighting design highlights architectural and structural features associated with the stations and station precincts. A common architectural feature element for all stations is the canopy roof structure. The interplay of daylight, shadow and artificial light of these is pivotal to the design as such, during the day, the continuous central roof lights will ensure high quality natural daylight and generous sky views.

At night the lighting will complement and enhance the architecture with warm white up-lighting to highlight the texture and warmth of the timber finish. The canopy will glow with warm reflected light guiding people through the station and visually connecting all new stations along Sydney Metro Northwest.

The schemes adopted for each precinct embrace best practice CPTED principles and are cognisant of the need for compliance with the recommendations to manage spill lighting within acceptable levels.

Open Cut Stations

For open cut stations, the concourse timber roof canopy is the key feature. Fully integrated and discreet lighting to the platform canopies will allow the visual focus to be on the up-lit concourse canopy creating a floating effect and supporting a strong and cohesive identity for the stations.

The lighting will provide a clear visual hierarchy of light to support way-finding and intuitive orientation. For example, at Cudgegong Road Station, arrival and exit points including entries, ticket gates and platform edges shall be clearly defined with light. Direct lighting will be provided in these areas to raise the lighting levels above the surrounding area light levels for orientation.

Lighting levels shall be carefully balanced to define specific spaces and provide visual interest while maintaining the required uniformities.

The lighting design will consider the overall journey to ensure a visually comfortable and consistent experience throughout.



Figure 4.117_Artist Impression of Lighting at Bella Vista Station. Source: Ai3D.

Cut and Cover Stations

For underground stations, the lighting is designed to enhance the transition between over ground and underground spaces. The light colour temperature transitions smoothly from 4000K crisp white light at the platform level to 2700K warm white light at the upper reaches of the canopy roof structure at the ground level. This careful selection of colour temperatures will subtly aid orientation with a defined hierarchy of light quality from the different zones. This is complemented by modulation of light levels whilst achieving high vertical illumination to provide a clear visual hierarchy using light, to support wayfinding and promote intuitive orientation.

The underground platforms will include a subtle wash of coloured light to the ceilings to provide a reassuring link to the outside world. The light colours and intensity are linked to a time of day dependant control system to emulate variations in white light encountered during the day. Typically, in the extreme, the natural colours vary from blue/violet for night-time, and amber and gold for sunrise and sunset. All colours will be mixed with neutral white for pastel shades rather than saturated colours. The transitions will be long and smooth, so that they are barely perceptible to passengers in the station, but add an element of discovery during the passenger journey and waiting times.

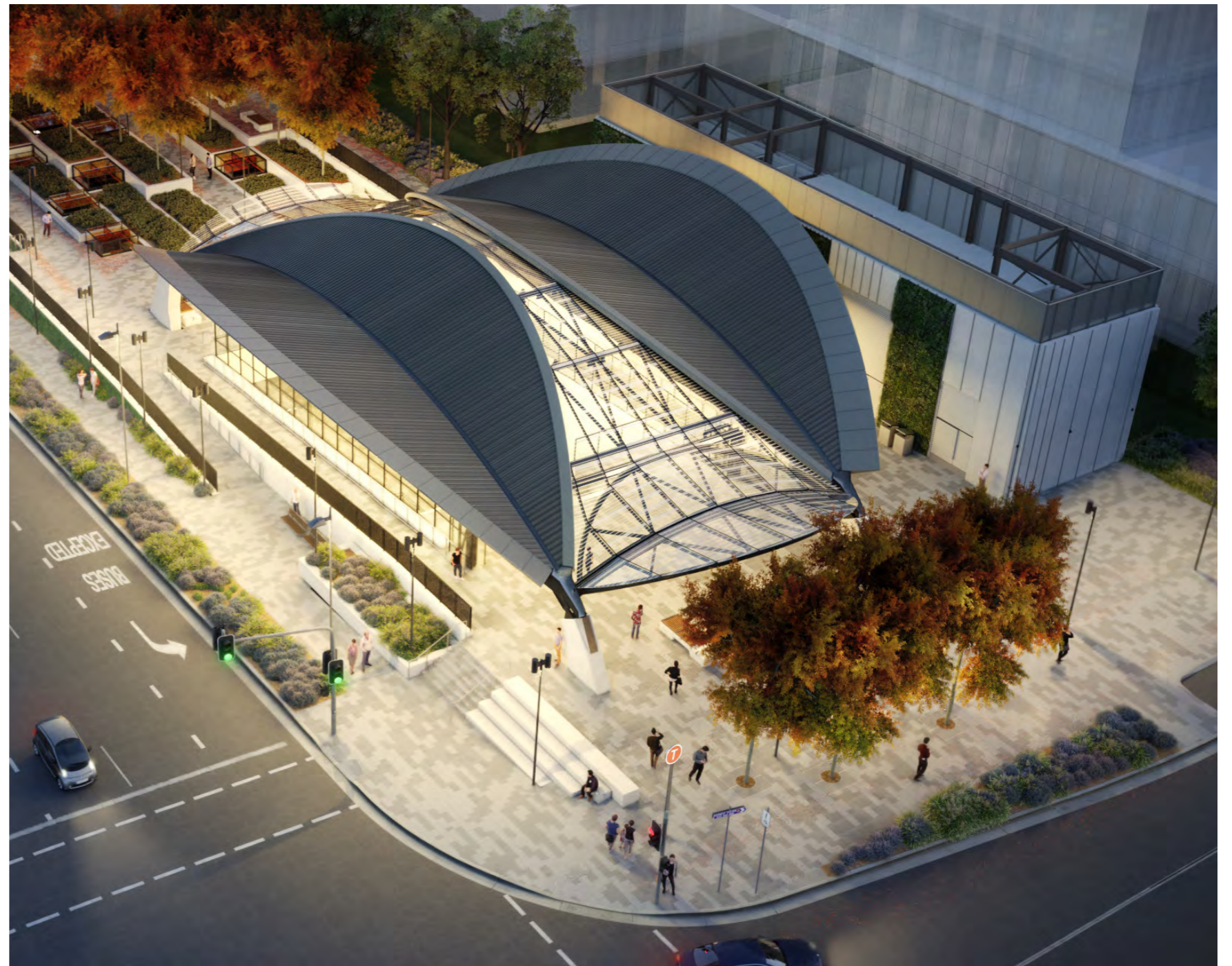


Figure 4.118_Artist Impression of Lighting at Norwest Station. Source: Ai3D.

Elevated Stations

For elevated stations, the key features are the viaducts and glazed façades. In these instances, the lighting design highlights the transparency of the façade to create a lantern-type 'beaconesque' effect at night. Focused soft washes of light to the viaduct structure will enhance the strength of these elements, highlighting the architectural form and creating a clear visual identity for the station.



Figure 4.119_Artist Impression of Lighting at Rouse Hill Station. Source: Ai3D.

4.13 Implementation, Management and Monitoring Strategy

An Access and Maintenance Strategy has been prepared to demonstrate how the management of access options are integrated into the design of the Sydney Metro Northwest stations and buildings with regard to maintenance and cleaning strategies.

The integration of access considerations into architectural design of the station canopies, building facades and surfaces is the key goal when designing the Kit of Parts. Safety and efficiency of cleaning and maintenance activities is an important aspect of the day to day operation of the station buildings

The strategy includes consideration of the cleaning and maintenance of the following components:

Open Cut Stations

Location	
1	Concourse Canopy Roof - Via EWP to centre of arch from primary plaza - 1500 x1500 flat platform (GENIE 3369 Scissor Lift 3885kg or GENIE 33/18 Boom Lift 3640kg) - From EWP attach to entry Anchor Point (AP) on roof and then disconnect from EWP AP and access roof - To move about the roof transfer from entry AP to perimeter XSPlatforms rail system - Perimeter rail set back 2m from edge - roof safe system – rail trolleys are to lock off in tension, suitable for rope access and fall arrest loadings, attached to roof sheeting and can be curved in two directions - Not necessary to walk along gutter - Tap included at midpoint of roof for cleaning - Pole wash glass roof from solid edge - Glass clean and or replacement on sloped ends can be accessed by rope access positioning from the XSPlatforms rail system and or the surface mounted APs on both sides
2	Platform Canopy Roof - Ladder bracket accessed from end of roof - Secure ladder and attach to anchor point - Connect to strop in transferring to centre rail - XSPlatforms rail system
3	Service Buildings Generally if less than 6m tall - Ladder bracket - Secure ladder and attach to anchor point - Connect to strop in transferring - Parapet is less than 1m attach to perimeter lifeline set back 2m from edge
4	Concourse PODS - as above
5	Lift - Access by EWP in concourse
6	Underside of Concourse Roof Canopy Timber - Accessed by EWP within concourse - Lights only within canopy, positioned for access from EWP - Areas for repair beyond concourse require access via Hi-rail Boom lift during track closure
7	Underside of Concourse Roof Canopy Glazing - Rope Access from concourse - Climb through steel structure with loop fastener that locks under tension - Glass raised above steel structure 150mm - Sections of glazing can be pole washed from escalators, concourse and platform
8	Concourse Glazed 2400 high Balustrade - Pole washed from landscaped embankment where applicable - Hi-rail Boom lift to access areas over trackway during shutdown - Scissor lift from platform
9	Underside of Platform Canopy - Accessed via scissor lift sized for lift
10	PEBs - Pole washed from platform and track during shutdown

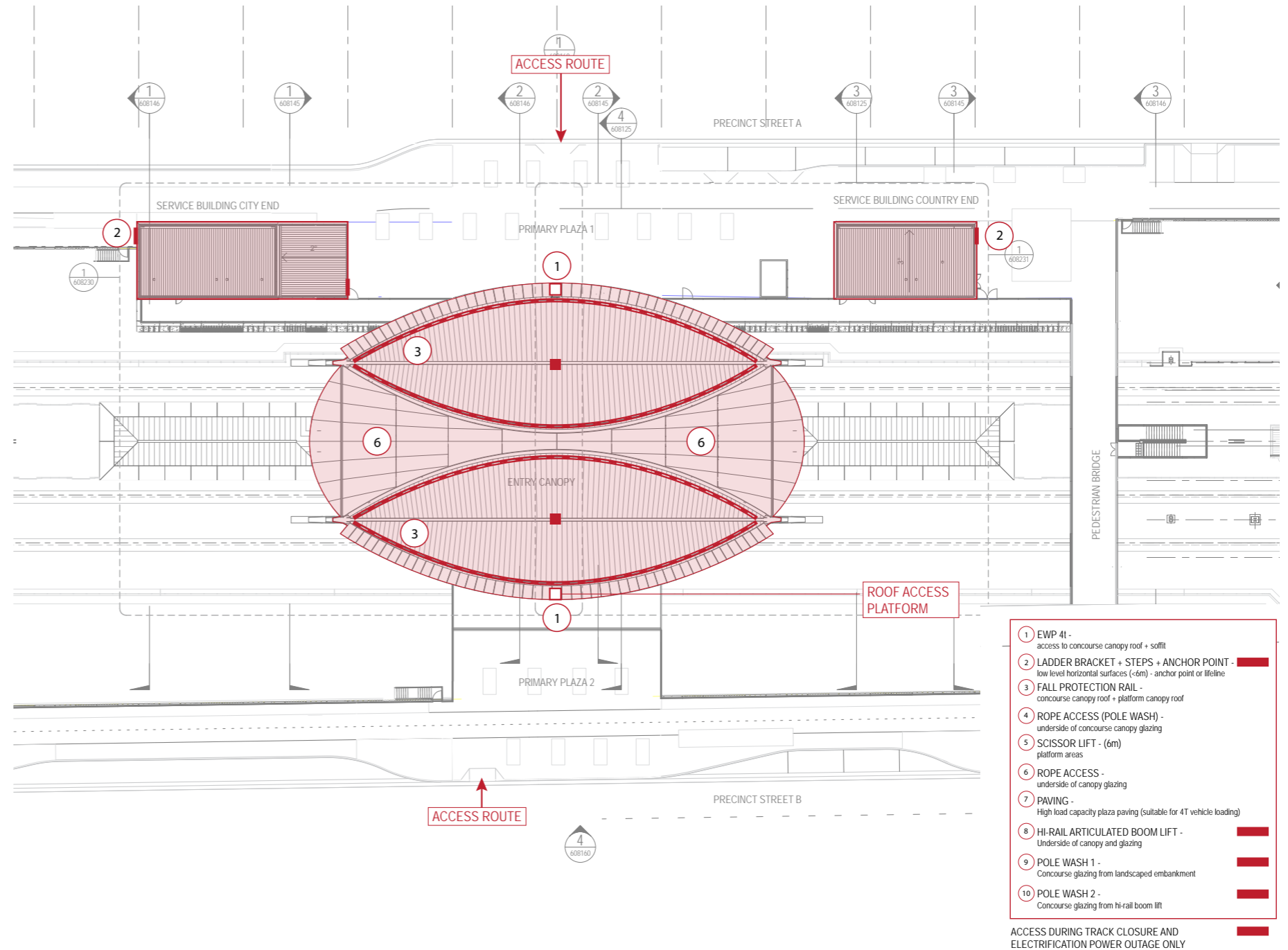


Figure 4.120_Open Cut Station Access and Maintenance Diagram. Source: HASSELL

Cut and Cover Stations

Location
1 Concourse Canopy Roof - Via articulated boom to centre of arch from primary plaza 1500 x1500 flat area - From EWP attach to entry Anchor Point (AP) on roof and then disconnect from EWP AP and access roof - To move about the roof transfer from entry AP to perimeter XSPlatforms rail system - Perimeter rail set back 2m from edge - roof safe system - rail trolleys are to lock off in tension, suitable for rope access and fall arrest loadings, attached to roof sheeting and can be curved in two directions - Additional surface mounted APs as required; suitable for rope access and fall arrest loadings - Not necessary to walk along gutter - Tap included at midpoint of roof for cleaning - Pole wash glass roof from solid edge - Glass clean and or replacement on sloped ends can be accessed by rope access positioning from the XSPlatforms rail system and or the surface mounted APs on both sides
2 Service Buildings Generally if less than 6m tall - Ladder bracket - Secure ladder and attach to anchor point - Connect to strop in transferring - Steps and flat platform required from parapet, top step can be flush with parapet - If parapet is less than 1m then attach to perimeter lifeline set back 2m from edge
3 Corner Service Building - Has external stair for access
4 Lift - Access by EWP from concourse
5 Underside of Entrance Roof Canopy Timber - Accessed by Articulated Boom
6 Underside of Entrance Roof Canopy Glazing - Rope Access from concourse - Climb through steel structure with loop fastener that locks under tension - Glass raised above steel structure 150mm - XSPlatforms rail system to glazing structure as required - TBC - Sections of glazing can be pole washed from escalators and concourse
7 Concourse Glazed 2400 high Balustrade - XSPlatforms rail system attached to the rear at high level
8 Concourse perimeter wall cleaning - via EWP and mobile scaffold as required
9 Skylights - Access from concourse via vertical work platform - anchor points within skylight
10 Platform Ceiling and walls, escalator balustrades/ fall arrest screens - Via small scissor lift and pole wash
11 Concourse balustrade glass - Pole wash from escalator
12 PSD glass - Pole wash from track during closure

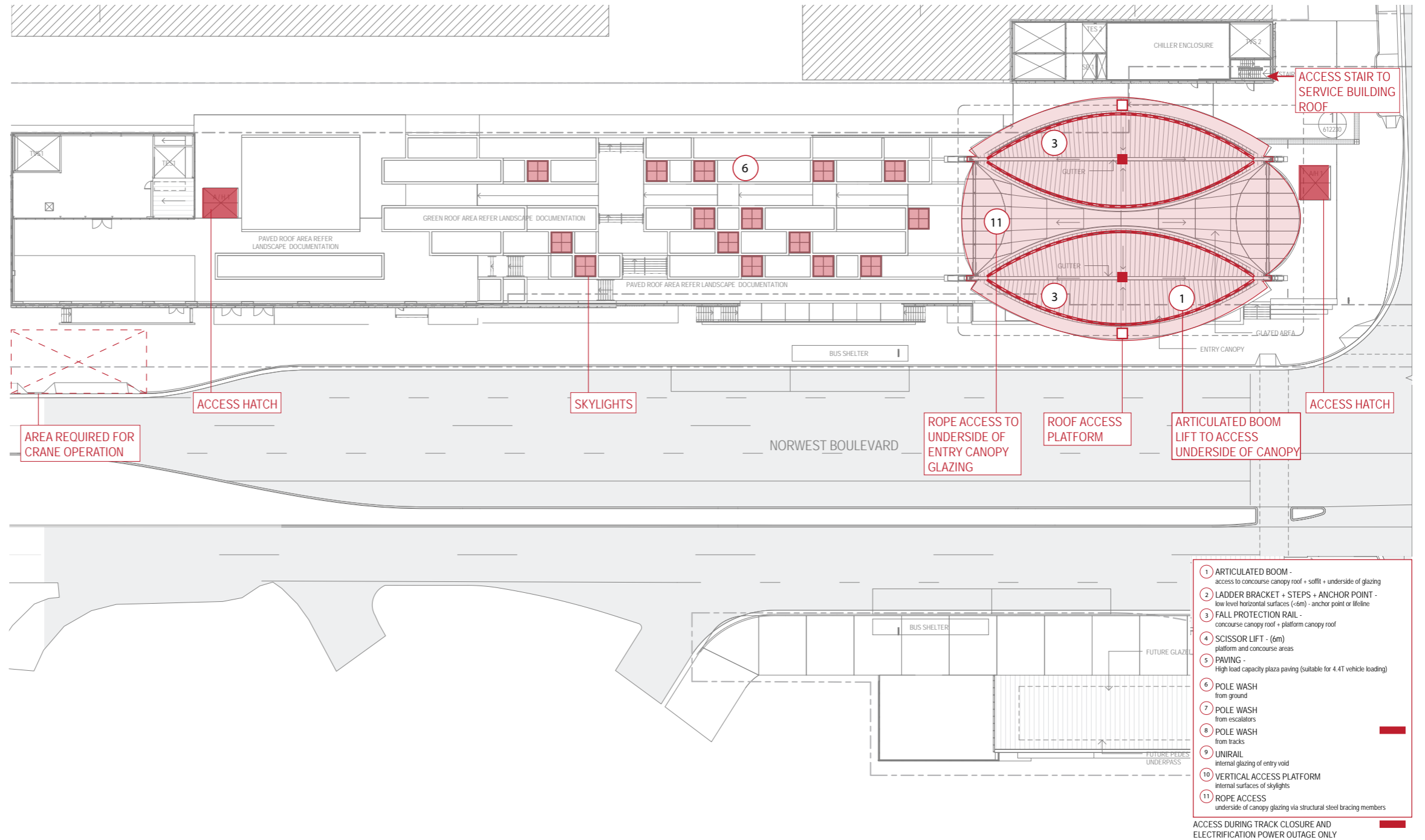


Figure 4.121_Cut and Cover Station Access and Maintenance Diagram. Source: HASSELL

Figure 4.122_Open Cut Station Access Diagram. Source: HASSELL

Elevated Stations

	Location
1	Main Facade - Via articulated boom from street - 5m minimum required between facade and street trees
2	Platform glazed balustrade - Via articulated boom from street
3	Service Buildings Generally if less than 6m tall - Ladder bracket - Secure ladder and attach to anchor point - Connect to strop in transferring - Steps and flat platform required from parapet, top step can be flush with parapet - If parapet is less than 1m then attach to perimeter lifeline set back 2m from edge
4	Lift - Access by EWP (GENIE 3369 Scissor Lift 3885kg or GENIE 33/18 Boom Lift 3640kg) from concourse
5	Underside of Entrance Roof Canopy Timber - Accessed by EWP within concourse - Lights only within canopy, positioned for access from EWP
6	Lower Concourse and Mezzanine glass - Pole wash from ground
7	Platform Canopy Underside - Via scissor lift
8	Platform Canopy - Via ladder and access hatch - Anchor point and strop while transfer to centre rail
9	Inside of facade - XSPlatforms rail system on side of continuous platform beam - Higher XSPlatforms rail system in escalator void - The rest pole wash from platform
10	Platform void balustrade - Pole wash from escalator
11	Entry Canopy - Ladder bracket and perimeter life line set back 2m from edge

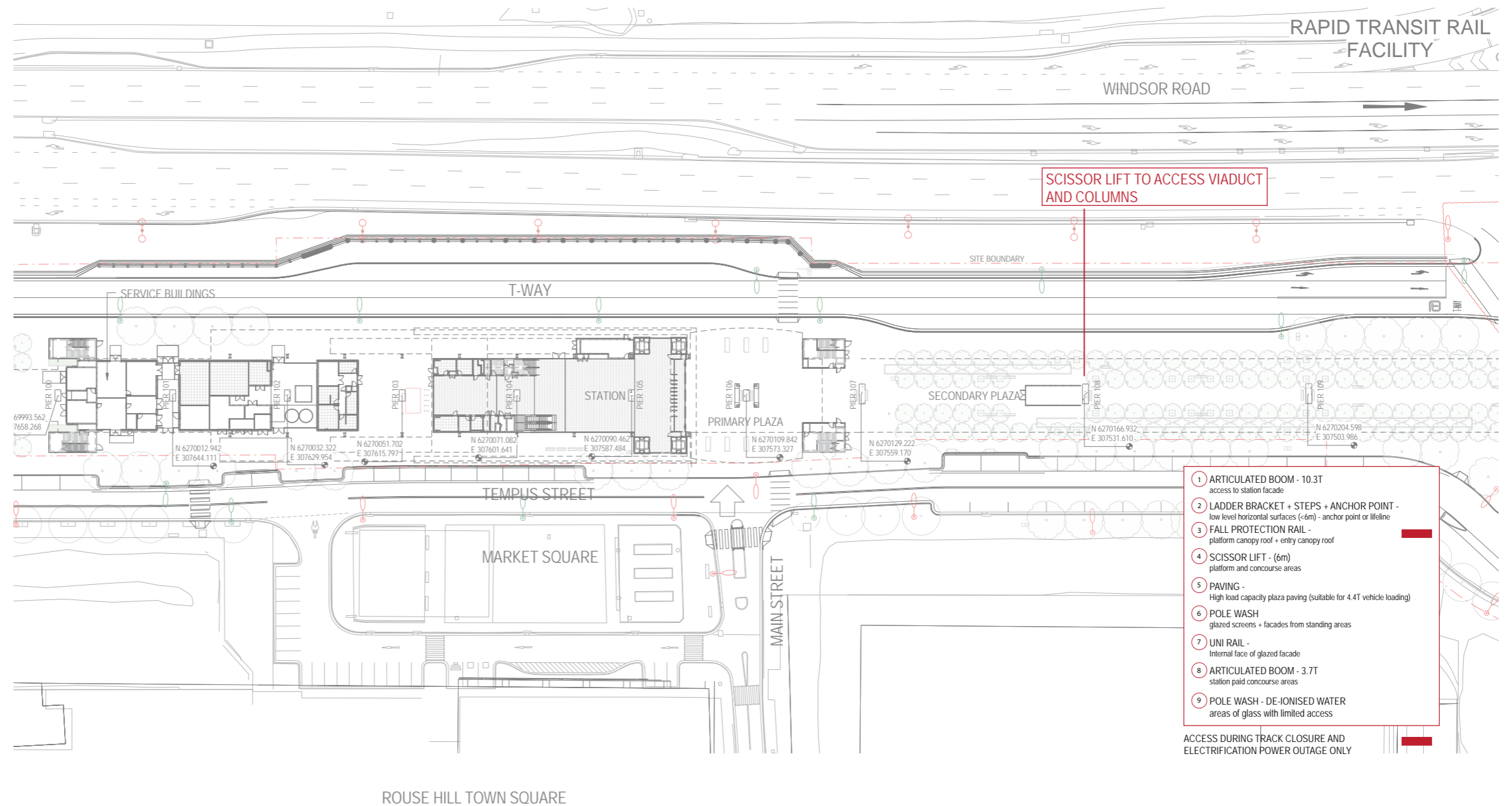


Figure 4.123_Cut and Cover Station Access and Maintenance Diagram. Source: HASSELL