



Light Rail Transit Stations

Kuala Lumpur, Malaysia



Architect: Arkitek Kitas Sendirian / Tay Kiam Seng

Client: Sistem Transit Aliran Ringan

Built Area: 60'190 m²

Cost: n.a.

Kuala Lumpur's first two light rail transit (LRT) lines were built on a limited budget. The c 27 miles of track serve 25 stations, many of them in challenging situations spanning over the river or existing roads. The design concept is based on the traditional Malay 'wakaf', or wayside rest-stop - a simple exposed timber structure with open sides and a layered roof. In the LRT stations this is translated into an exposed structure with minimal brick or concrete masonry walls and a layered roof consisting of metal decks supported by large-span tubular steel members.



2007 On Site Review Report

3198.MAL

by Hanif Kara

Light Rail Transit Stations

Kuala Lumpur, Malaysia



Architect

Arkitek Kitas Sendirian / Tay Kiam Seng

Client

Sistem Transit Aliran Ringan

Design

1994 - 1996

Completed

1998

Kuala Lumpur Light Rail Transit System

Kuala Lumpur, Malaysia

I. Introduction

Sistem Transit Aliran Ringin (STAR) is the operator of System 1 of the Kuala Lumpur Light Rail Transit System (KLLRT). This was built in two phases. Phase I is approximately 12 kilometres long and runs from Ampang to Jalan Sultan Ismail. The first 9.5 kilometre-stretch is at-grade, utilising the existing but disused Malayan Railways corridor; the remainder of the route is elevated. Thirteen stations were built for Phase 1, including an administration building and depot and stabling yard at Ampang.

Phase II is approximately 15 kilometres long and extends the Phase 1 line in both directions: 3.2 kilometres northwards (along the elevated portion) to Sentul Timur, and 11.8 kilometres southwards to the Commonwealth Games Village and Bukit Jalil Station, which serves the national sports complex. Twelve stations were built and the Ampang depot and stabling yard was expanded.

II. Contextual Information

A. Historical background

The Ampang and Sri Petaling Line of Kuala Lumpur LRT system was commissioned by the Malaysian government, KL City Hall and other parties in the franchise agreement including the train-operator, STAR.

Architect Kitas Sdn Bhd was only involved after the franchise agreement had been signed and the route, location and facilities of stations were already determined. Stations were designed based on a low budget.

This pioneer LRT system in Kuala Lumpur was in operation by 11 July 1998.

B. Local architectural character

Architecture in Kuala Lumpur is heterogeneous, expressing the city's diverse history and cosmopolitan culture. Public buildings, housing estates, mosques, churches and Buddhist and Hindu temples grace the city. The British 'Raj' style, imported from India, shaped the administrative and public buildings located close to the centre. Other buildings have features of Mughal Indian architecture, prominent minarets, copper-clad onion domes and Moorish horseshoe arches. Chinese 'shop-houses' are the characteristic building type of the city centre. Added to this mix are a number of recent skyscrapers, with more under construction.

C. Climatic conditions

Kuala Lumpur lies about 3° north of the equator. Typically, the city is hot and humid with intense sunshine and heavy rainfall. Temperatures average 29-32°C, humidity 60-70 per cent.

D. Site and surroundings

There are two generic types of stations: at-grade and elevated. The at-grade stations have the vestibule at train platform level on one or both sides. The elevated stations generally have the vestibule above ground level, with the train platform above.

E. Topography

The varied topography of the city is matched by:

- Stations hugging the terrain
- Stations cantilevering over the river
- Stations spanning over the river
- Stations spanning over existing roads

III. Programme

A. History of the inception of the project

The Government of Malaysia had pondered the idea of a mass transit system for KL for some time. After a number of failed attempts by other parties, the Kuala Lumpur Transit Group stepped in, with the support of the government, to build the pioneer LRT System.

B. How were the architects and specialists chosen?

The architect and specialists were selected by Taylor Woodrow International, the design-and-build turnkey contractor for the STAR LRT Phase I & II. Arkitek Kitas Sdn Bhd was the only consultant re-engaged to design the stations for Phase II.

C. General programme objectives

The primary objective of the Light Rail Transit System was to provide a quick, efficient and comfortable means of accessing the city from the suburbs.

Further considerations were:

- To establish the notion of predictable travel times; generally public transport did not follow specific or regular timetables
- To act as a growth inducer in the city as well as in the suburbs
- To provide greater connectivity and a common ticketing system between the various LRT/ monorail systems, so contributing to a reduction in car use and traffic congestion.

D. Functional requirements

To design stations at areas designated by the franchise agreement, in a manner responding to local situations.

IV. Description

A. Building data

Arkitek Kitas Sendirian was involved from the schematic design stage up to the working drawing stage for all the stations of Phase 1 and 2 with the exception of Plaza Rakyat Station, which was designed by Skidmore Owings and Merrill (Chicago).

The design concept for the stations was influenced by the traditional Malay wakaf, or wayside rest stops, that used to be dotted along the routes between towns and villages. The typical wakaf was a simple exposed timber structure, occasionally resting on stilts. It was based on an open plan, with open sides, and had a layered roof. In the LRT system, the station represents the wakaf, while the train ride is the 'journey' undertaken.

The design translates the key elements of the wakaf into open-plan structures resting on columns, layered roofs and exposed structural components. The exposed structure of the stations encourages natural cross-ventilation, takes advantage of day-lighting and opens up vistas to the surroundings. The extensive use of natural lighting and ventilation reduces energy consumption. In the elevated stations, wide overhangs and stepped roofs over staircases give a feeling of lightness and reinforce upward movement, drawing the eye towards the train platform.

The curved roofs were derived from the simple exposed fish-belly trusses of the at-grade station train platforms. They serve a double purpose, channelling water away from the tracks while allowing sufficient clearance for the trains. Steel and curved elements were used to project a progressive, modern interpretation of tropical architecture. The architects have strived to produce stations that are sympathetic and responsive to the tropical environment while possessing a consistent architectural order and identity.

The curved steel roofing, with exposed and expressed trusses, also utilises the large-span capabilities of steel to create spacious vestibule areas and train platforms that have few columns or obstructions to passenger movement. These open areas further encourage the circulation of air and bring more natural light into the station. Heat is channelled through convection currents escaping through the jack roof above.

Planters have been incorporated to soften the solid impression of the concrete structure. Where possible, they adopt a curved shape. Hardwearing floor surfaces are used throughout. Yellow strip tiles are used as a safety feature at platform edge and the top and bottom of stairs.

The openness and natural ventilation create spacious and elegantly pleasing stations that blend in with their surroundings.

B. Architectural descriptions of nine stations along the train line:

Salak Selatan Station

This is an at-grade station located behind several rows of existing pre-World War II shop-houses off Sungai Besi Road. A new access road is provided with bus and taxi drop-offs.

The station has two train platforms, a vestibule area including service rooms and a separate subway with stairs and ramps for fare-paying passengers and the general public respectively. The station design has been kept simple and unobtrusive.

The basic fish-belly roof truss over the station platform expands to a larger version denoting the vestibule area where passengers converge. The entrances to the station have reinforced-concrete porches that mirror the solid quality of the adjacent shop-house entrances. They also act as a transition between the surrounding buildings and the curved metal roofs of the station.

Tasik Selatan Station (BHP 2000 PAM Colorbond Awards – Merit Award)

This station is an interchange for Tasik Selatan Commuter Train Station – a footbridge connects the two. It is also near an Express Rail Link Station that will connect the new Kuala Lumpur International Airport to the city in the future.

The at-grade station structure has a central platform and a vestibule area linked by a footbridge with stairs. The vestibule area, which includes service rooms, is set at the same level as the platforms.

The elongation of the station from entry to platform presented an opportunity to transmute the theme of the curved roof to expressed double-curved trusses over the vestibule. This curve reflects the dynamic nature of the train journey. It also further reinforces the journey of the commuter through the station. Over the platform, the roof assumes the form of a single layered curve. Sweeping one over the other, the layers of the roof seem to ripple with the gentle breeze that wafts through the station.

The combination of the uncluttered curved roofs and cool colours gives this station a dynamic yet serene quality.

Bukit Jalil Station

This elevated station is located down the hill from the national sports complex, to which it is connected by a large plaza and a broad set of stairs.

It has two platforms over nine metres wide, with service rooms at the vestibule level. Stairs and escalators are provided from the vestibule level to each platform. The vestibule has an insulated metal roof on exposed double-curved tubular metal trusses. The platform roof structure consists of bow-shaped steel trusses spanning 46 metres. These are supported by groups of inclined tubular steel props that fan out from the tops of the steel columns on the platform. A series of membrane panels are tensioned onto this frame. These are fabricated using 'Precontraint 1202' fabric with a self-cleaning 'Fluotop' polymer coating. The

membrane roof is designed to blend in with the membrane-roofed structures in the sports complex. It diffuses the sunlight on the platform during the day, while transmitting a soft glow at night from the upward throw (40 per cent upwards, 60 per cent downwards) of the high-powered lamps below. This is the largest of the stations, catering for the large crowds that attend big sporting events (including the forthcoming Commonwealth Games in September 2007).

The collaborative effort between the architects and engineers Ove Arup and Partners International with Arup Jururunding Sendirian Berhad worked very well in this station, given the complex structural issues involved.

The architecture seeks to match the feeling of expansiveness, expectation and drama that accompanies sport events with large spaces where columns are spaced far apart, a progressively rising double-curved metal roof with expressed trusses at the vestibule, and the delicate steel structure of the membrane roof. Strong lines and diagonals formed by the stairs and escalators lend a dynamic sense of movement, while the use of sun-breakers articulate and enliven the elevation. The membrane roof is not only curved in section but in three dimensions, and is a logical evolution of the simple curved roof of the at-grade station train platform.

The progression of the visual drama from the entry begins with the cool, shaded vestibule with its roof that arches upwards, drawing the eye towards the platform bathed in light. At the platform, the steel structure supporting the membrane roof is quite complicated, yet does not overwhelm. It takes part in the play of light with its delicate filaments reaching to all sides of the roof, producing a dramatic sense of spaciousness in the large open-sided platform area. At night the station is bathed in light from the halide lamps and from a distance twinkles like a jewel.

With its strong lines and diagonals the solid reinforced concrete base complements the delicate steel structure above, embracing its site and surroundings. The resulting station is visually stunning and satisfying.

Sri Petaling Station

Located adjacent to the Commonwealth Games Village, this station is accessible through the Games Village Access Road.

It consists of two platforms, a vestibule area about 7 metres above the platforms, and a covered footbridge connecting the vestibule to the platform over the tracks. Service rooms are located adjacent to the vestibule, whilst equipment rooms are located off the platform beneath the vestibule. The station roof has a continuous strip opening in the middle, over the tracks, to enhance natural daylight and ventilation.

Commuters enter the station at a higher level and descend to the platform. The entry porch consists of two curved roofs supported by steel 'finger' trusses, while the steel trusses over the vestibule are a magnified and stretched version of the fish-belly truss.

The architects have sought to design a structure in harmony with the hill on which the station stands. The entrance is low-key and does not dominate its surroundings. The expressed steel structure is kept simple and the station unfolds as the commuter progresses through it, revealing more vistas through the layered roofs.

At night, the lighting emphasises the strong directional movement through the station, enhancing its powerful diagonal shape. From a distance, the station's proximity to the hill creates a fascinating play of geometric shapes, with the layered roofs over the stairs almost embracing the hill and becoming a logical extension of it.

PWTC Station

This elevated station is located over the Sungai Gombak river, adjacent to Putra Place Shopping Centre and across the road from the Pan-Pacific hotel and Putra World Trade Centre.

Although simple in appearance, it was actually quite complex and difficult to construct. The station and the viaduct are supported by two massive concrete beams straddling the river, each with a span of 35 metres. The station is also supported on tubular steel trusses and steel I-beams. Curved steel elements have been adopted for the roof.

The construction of the station is unconventional, as the floors and staircases use precise concrete formwork. This method was used in order to shorten the construction time and eliminate the need for conventional formwork support systems over the river. A glass screen is used between the vestibule and platform soffit to allow light penetration whilst preserving views to the outside and providing protection from the elements.

Gently rounded shapes are used as a foil to the mass of the concrete beams. The platform roof ends terminate with half-dish aluminium roofs, the first of their kind in the country.

The station has been conceived as a rounded, curvaceous foil to the hard angular buildings around it. Set on the river, it evokes the image of a ship about to be released from its moorings – an image reinforced by the curved roofs, which have evolved into an almost elliptical shape, with the roof ends following a half-dish shape that suggests a hull. The analogy of a ship (or a space ship) is further enhanced by the use of strong colours on the tubular steel structure, which makes it look like the landing gear of some futuristic vehicle.

From their vantage point on the station commuters have a dramatic view of the flow of people and vehicles advancing along the busy street below. The side staircases and escalators serving the vestibule from the street and the footbridge converge at the vestibule, making it an extension of the street.

Masjid Jamek Station

This elevated station, built in Phase I, spans over Tun Perak Road and across the Sungai Klang river. It has two vestibules, one on either side of the road over the river. One vestibule is adjacent to Masjid Jamek, the mosque located at the confluence of Sungai Klang and

Sungai Gombak rivers. This is a historically important area, as the site of the first settlements of Kuala Lumpur, and it contains several fine old buildings.

The platforms are connected to the vestibules by means of stairs and escalators. The vestibules are directly accessible from the street by stairs. Service and equipment rooms are located on the perimeter of the vestibules, some opening directly onto the pavement.

The station viaduct and platform rest entirely on two piers, one on each side of the river along the middle of Jalan Tun Perak. As weight was a critical factor, steel trusses and a GRP (glass reinforced polymer) roof was used, the GRP roof being one of the first of its kind (in terms of size and complexity) in the country.

Titivangsa Station (BHP 2000 PAM Colorbond Awards – Second Prize)

This elevated station is located adjacent to the Pekeliling Flats and is linked to the Pekeliling bus station across the road by a covered footbridge.

It has an elevated vestibule with two elevated platforms above. Stairs and escalators lead from ground to vestibule, and from vestibule to platform. Part of the vestibule and platform overhangs the Sungai Gombak, supported by tapering cantilever beams along the river wall.

This station's curved roof truss expands into an arching three-dimensional V-shape in order to span both platforms. Layered roofs, particularly over the stairs, impart a rhythmic motion and create a sleek, light and modern building filled with motion and vibrancy – a reflection of the busy streetscape below.

Bandar Baru Senul Station

This elevated station layout is basically similar to Pekeliling Station. A road runs partly under the station. A covered footbridge provided with stairs and escalators spans across the road and connects to the vestibule.

The curved arching roof over the platform is similar to Pekeliling Station, as is the layered roof over the stairs from the vestibule. The station gives the impression of rhythmic motion, almost like a large bird about to take flight.

Bandaraya Station

Bandaraya Station takes its name from Kuala Lumpur City Hall, located up the road. It sits on a narrow strip of land bordered by Jalan Raja Laut and the Sungai Gombak river. A covered footbridge over Jalan Raja Laut leads to a major shopping precinct in Jalan Tuanku Abdul Rahman. The station was built under Phase I of the Light Rail Transit System.

The platform and vestibule are elevated. The vestibule is accessed by escalator and stairs from the footpath along Jalan Raja Lout and Sungai Gombak river. The steel stairs over the river and part of the vestibule are suspended by stainless steel hangers from the steel roof trusses over a span of 13 metres.

The mass of the station is reduced by the use of curved roofs, presenting a softer image in contrast to the angular buildings nearby. The layered roofs over the open and airy staircases over the river impart a feeling of floating along the water, while offering views of the lush greenery beyond. The proximity of Masjid Jamek led to the adoption of Islamic motifs and patterns, which are realised in the GRP roof at the platform and in the GRC (glass reinforced concrete) panels surrounding the base of the station.

The station does not draw too much attention to itself. The architects deliberately adopted a 'low-key' approach to the design, keeping the roof low-slung, using curved elements, and applying smooth transitions between the different sections of the station. The result is an unassuming yet sleek and elegant station that sits over the river and arches over the busy road below. The continuity of the curved GRP roof from stairs to platform has an almost liquid character. The station is heavily used as it is in a particularly busy part of the city. People are drawn to it, as a place to meet and to observe the action of the busy streetscape below.

C. *Structure, materials, technology*

Stations generally: base and platform is reinforced concrete frame, infilled with brick or concrete masonry units finished with plaster/spray-textured paint. Floors have a homogeneous tile finish, with strips of yellow tiles used to define the safety zones on the platform.

Roof structures sit on reinforced concrete columns and consist of tubular steel members. Roofing is metal deck, with the exception of Masjid Jamek Station (GRP) and Bukit Jalil Station (PVC-coated polyester fabric with polymer coating).

Viaducts are in pre-stressed concrete.

D. *Origin of professionals*

Main projects

Train operator:	Sistem Transit Aliran Rigan Sdn Bhd
Architect:	Arkitek Kitas Sdn
Principal-in-charge:	Tay Kiam Seng
Design team:	Amy JG Lim, Chris Fredericks
Assistants:	Fadzilah Talib, Jamil A Hamid, Tang Siew Kim, Yeong Kwong, Meng Wagiman Saipan
Civil & structural engineer:	Genendra Ahmad Associates Sdn Bhd (local Malaysia)
Mechanical/electrical engineer:	Kavaerner Petrominco Sdn Bhd (local Malaysia)
Landscape consultants:	Aroma Tropics Sdn Bhd (local Malaysia)
Viaduct consultants:	Robert Benaim & Associates (UK)
Design manager:	Symonds Travers Morgan (M) Sdn Bhd (UK)
Main contractor:	Taylor Woodrow Projects (M) Sdn Bhd (UK & Local)

Building & civil works

Main subcontractor:	ABB Daimler-Benz Transportation (Projects) Sdn Bhd equipment supplier
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Main subcontractor: ABB Daimler-Benz Transportation GmbH (Germany)
M&E works
Independent checking engineer: Acer Electrowatt Consultants Sdn Bhd (Local)

System I Phase II

Train operator: Sistem Transit Aliran Rigan Sdn Bhd
Architect: Arkitek Kitas Sdn
Principal-in-charge: Tay Kiam Seng
Design team: Amy JG Lim, Chris Fredericks, Najib Ariffin
Assistants: Egardo Romen, Fadzilah Talib, Jamil A Hamid,
Joselita Alvarez, Wagiman Saipan
Civil & structural engineer: Ove Arup & Partners International/
Arup Jururunding Sdn Bhd Consortium
(Local/International)
M&E engineer: Ove Arup & Partners International/
Arup Jururunding Sdn Bhd Consortium
(Local/International)
Landscape consultants: Peter Tan Associates Sdn Bhd (Local)
North viaduct consultants: Robert Benaim & Associates (UK)
Main contractor: Kuala Lumpur Transit Group Sdn Bhd
Main subcontractor: Taylor Woodrow Projects (M) Sdn Bhd (UK & Local)

Building & civil works

Main subcontractor: ABB Daimler-Benz Transportation GmbH (Germany)

Equipment supplier

Main subcontractor: ABB Daimler-Benz Transportation (Projects) Sdn Bhd

M&E works

Independent checking engineer: Acer Electrowatt Consultants Sdn Bhd (Local)

V. Construction Schedule and Costs

Data not available. The architect reiterated that consultants were not given access to the accounts and finances of the project as the Malaysian government and STAR had classified the franchise agreement as Private & Confidential. I made one more attempt to seek the cost of one station from the current operators, but they were unable to provide this.

VI. Technical Assessment

It is difficult to summarise so many stations for this purpose. Suffice to say that I learnt that most of the professionals involved were expatriates who have now left Malaysia. The materials generally are local and low-cost.

VII. Persons Involved

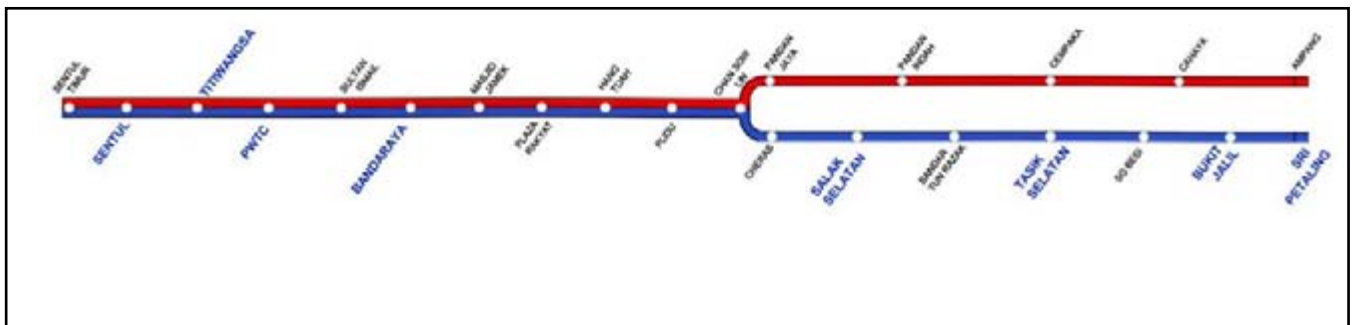
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VIII. Bibliography

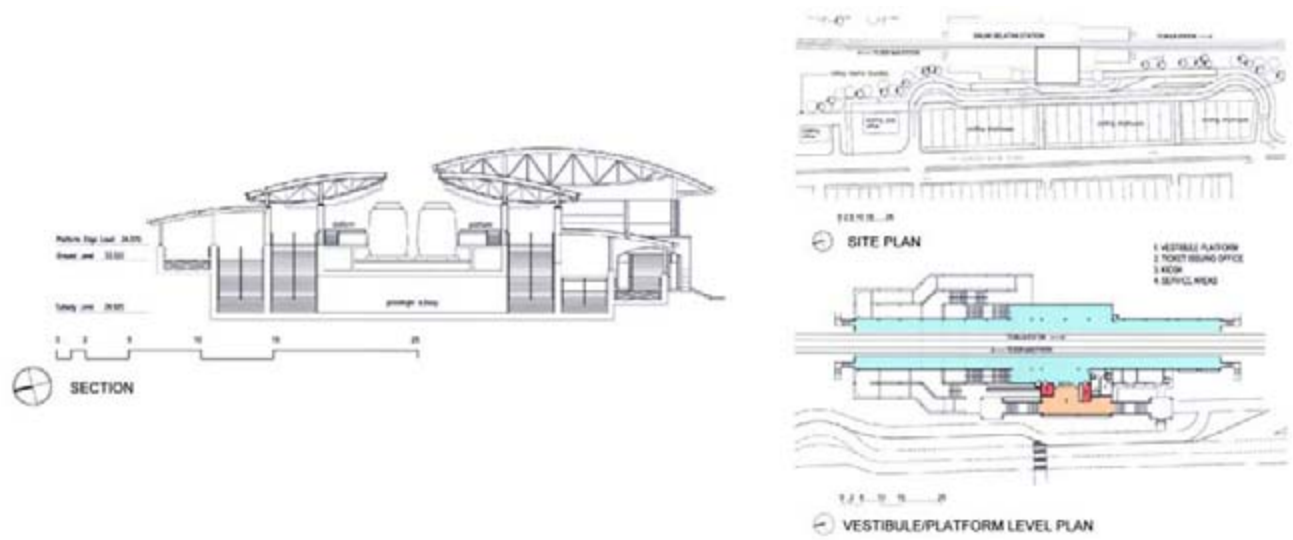
PAM Magazine March/ April 2000

Hanif Kara and Chin Pak Loong

May 2007

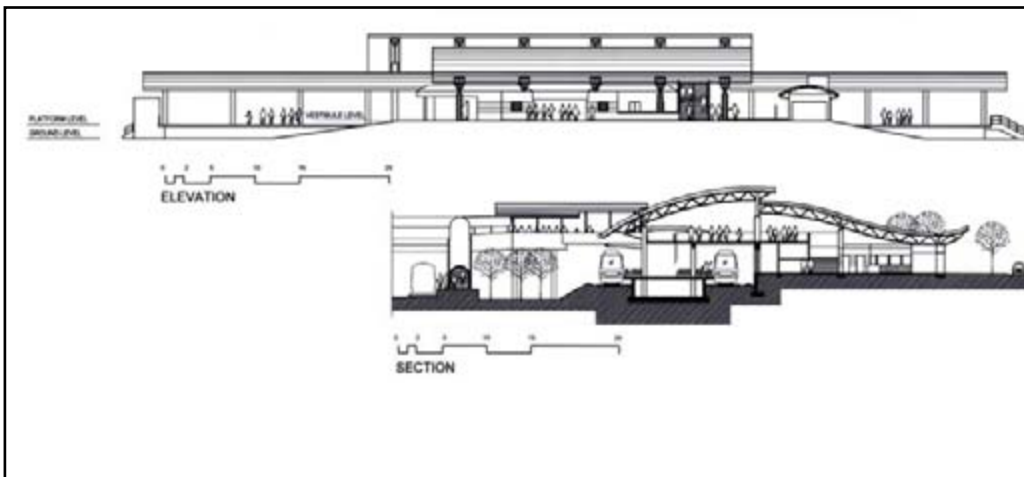
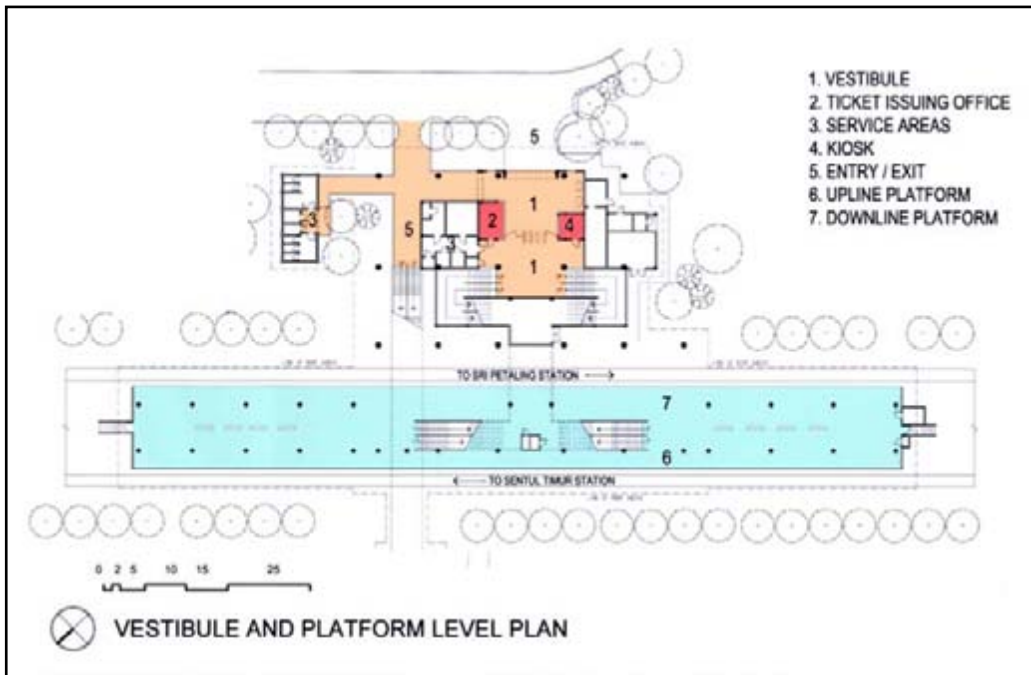


Salak Selatan station, plan and elevation



Salak Selatan station platforms.





Tasik Salatan station, plan and elevation



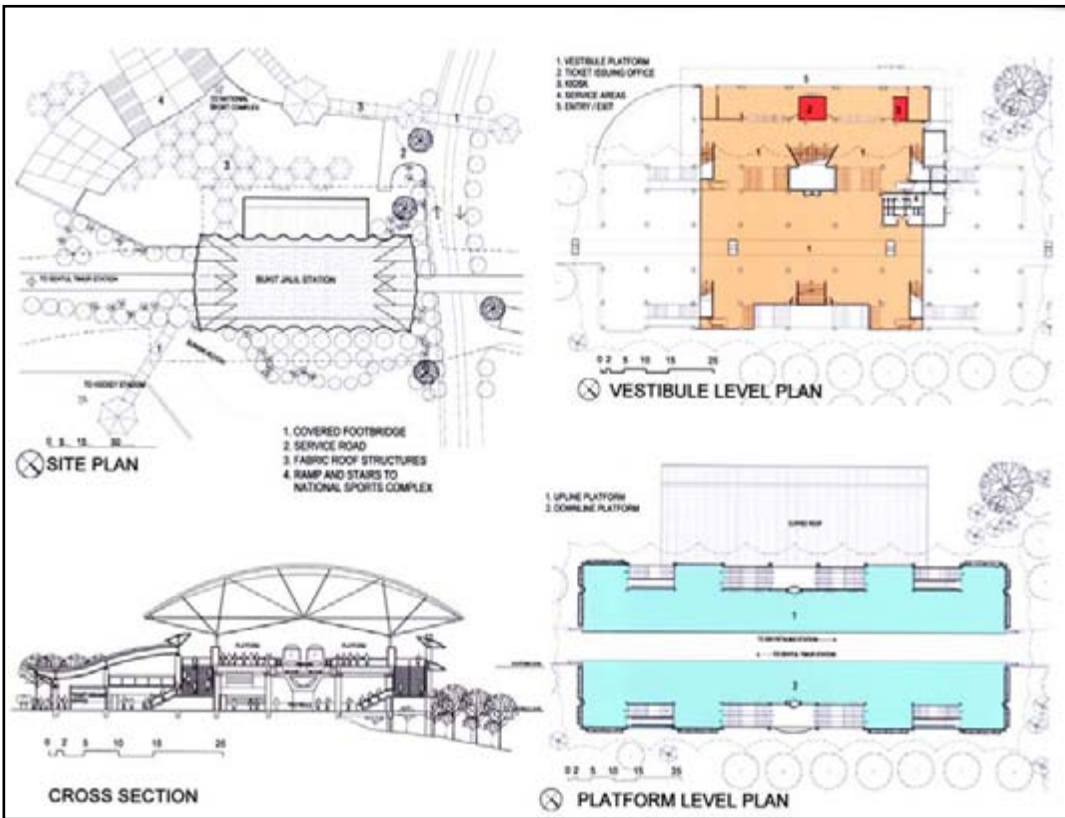
Tasik Salatan station



Tasik Selatan station, exterior view.



Tasik Selatan station platforms.



Bukit Jalil station, exterior view.



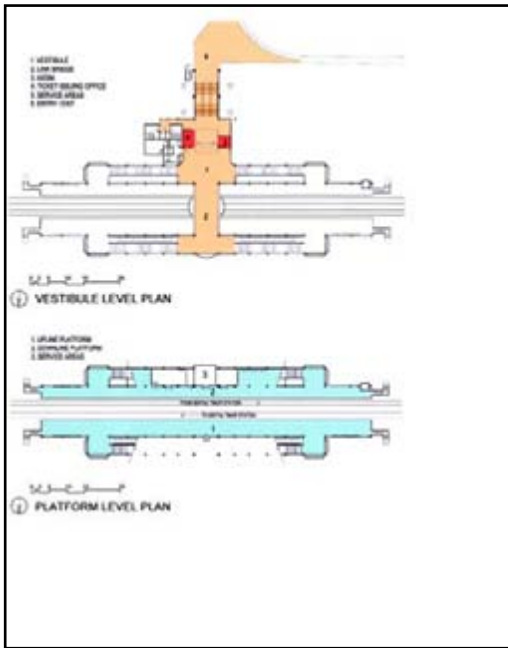
Bukit Jalil station viewed from street.



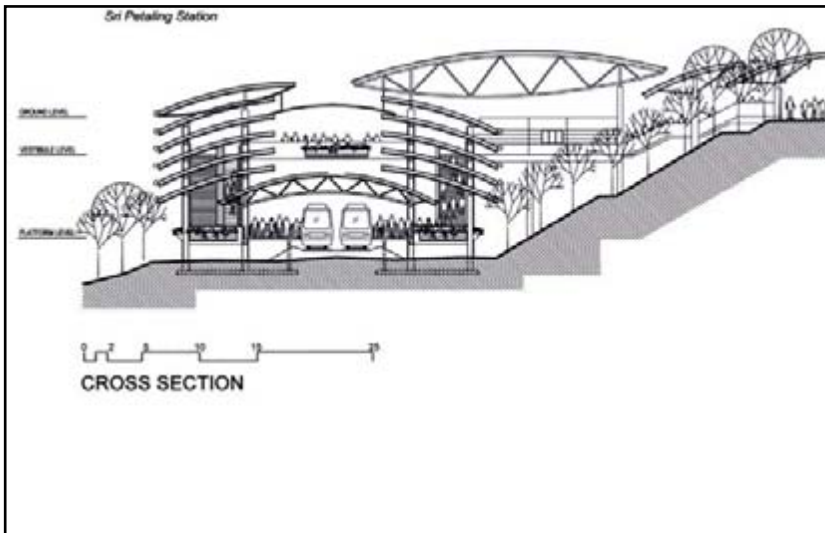
Bukit Jalil station viewed at night.



Bukit Jalil station, platforms and canopy roof.



Sri Petaling station, plan and section

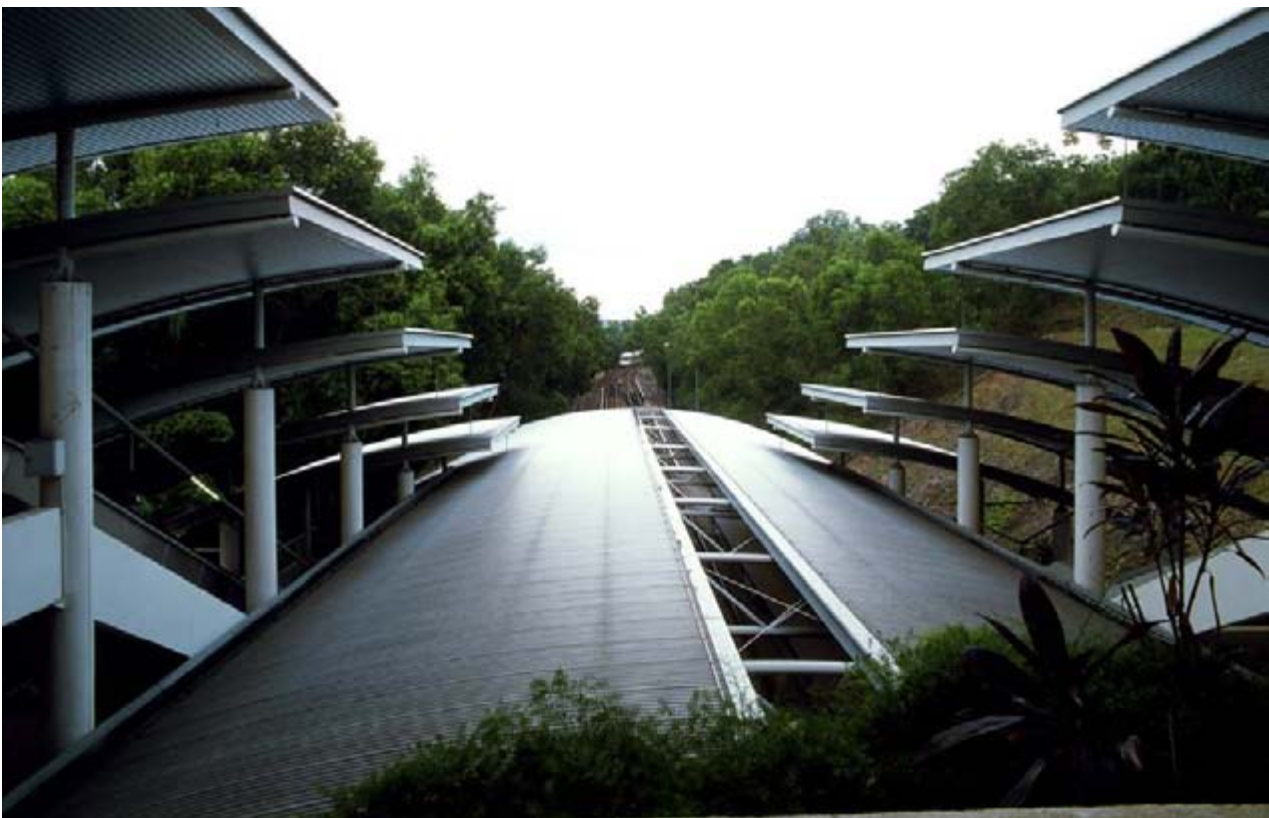


Sri Petaling station, exterior view.



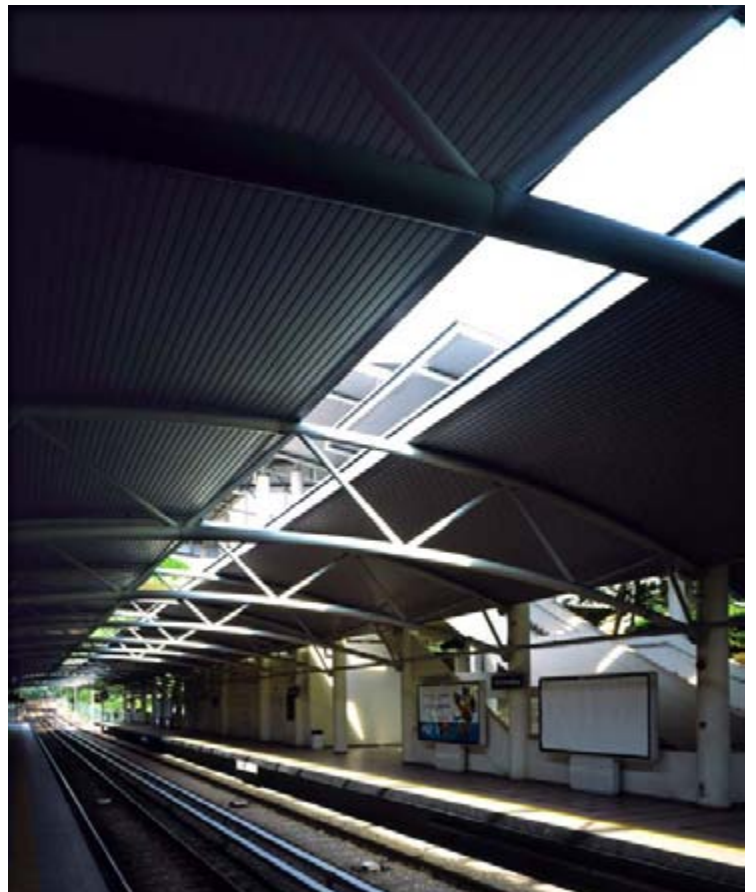
Sri Petaling station, stair leading up to platform.

Sri Petaling station, layered roofs reveal more vistas as commuters enter the station.

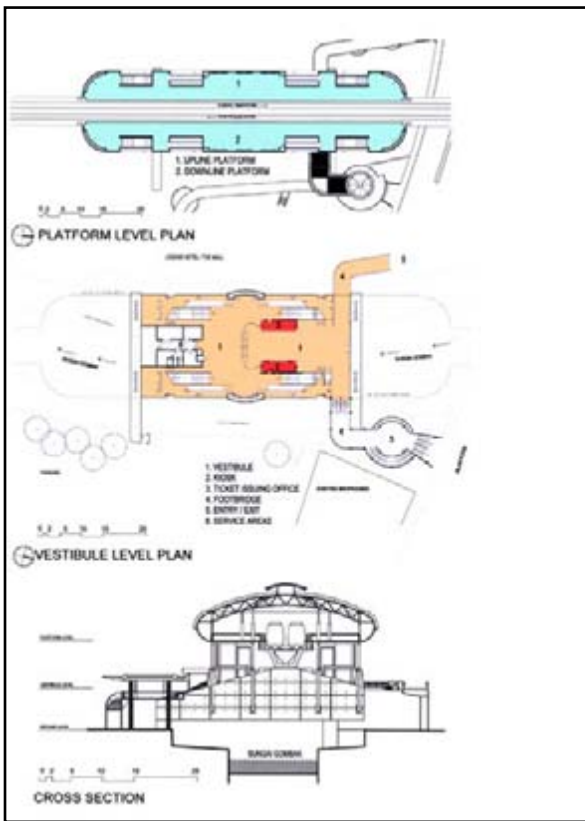




Sri Petaling station, curved roof supported by steel “finger” trusses.



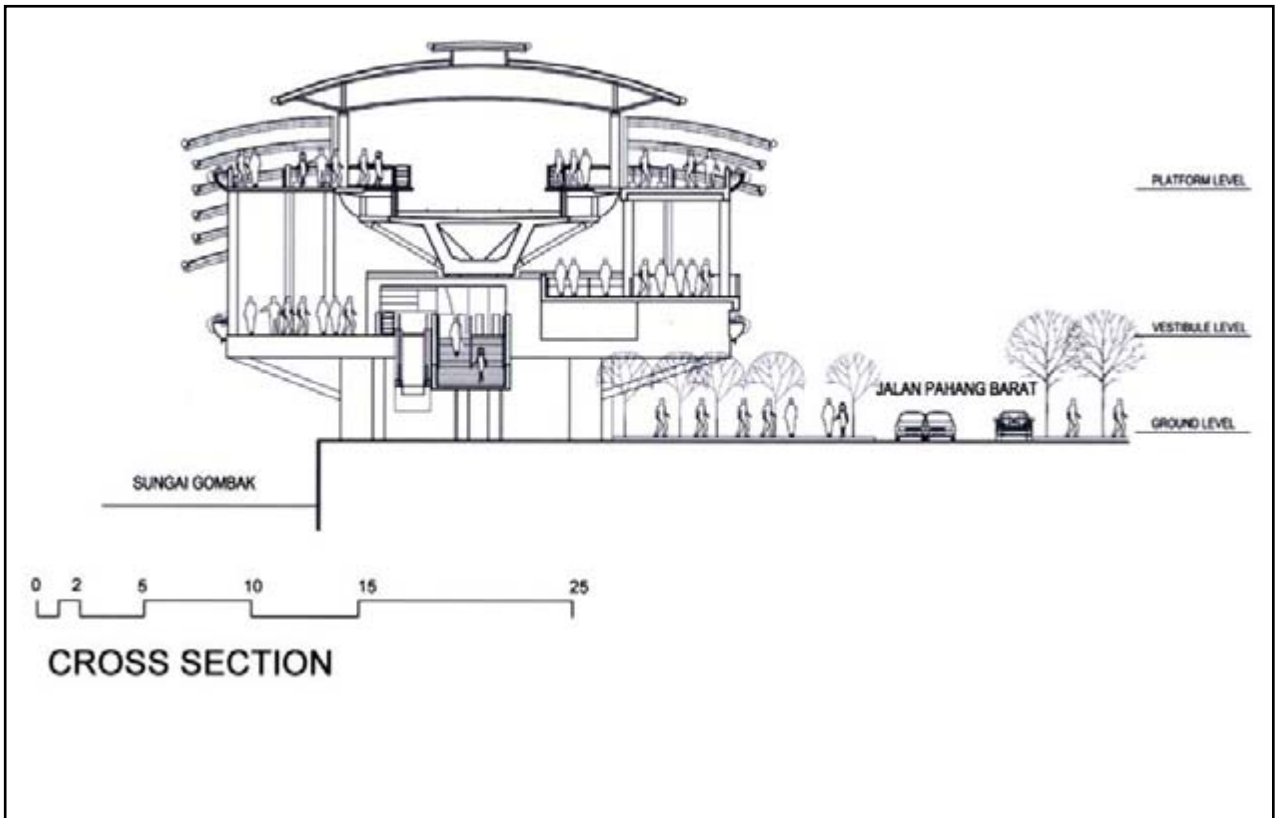
Sri Petaling station, platforms.



PWTC station, plan and section.

PWTC station, exterior view





Titiwangsa station, section.

Titiwangsa station, viewed from the street.



Light Rail Transit Stations

Wilayah Persekutuan
Kuala Lumpur, Malaysia

Architects Arkitek Kitas Sendirian / Tay Kiam Seng
Kuala Lumpur, Malaysia

Clients Sistem Transit Aliran Ringan
Petaling Jaya - Selangor,
Malaysia

Commission 1994

Design 1994 - 1996

Construction 1993 - 1998

Occupancy 1998

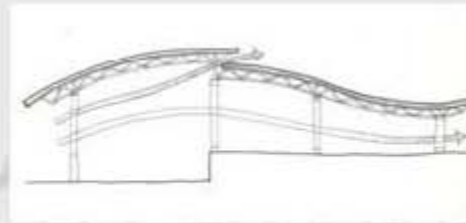
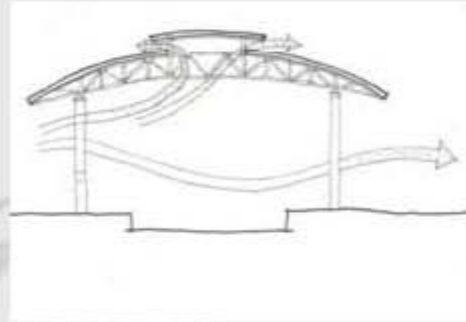
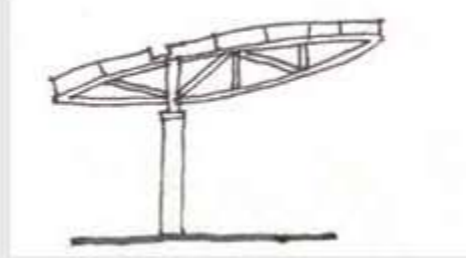
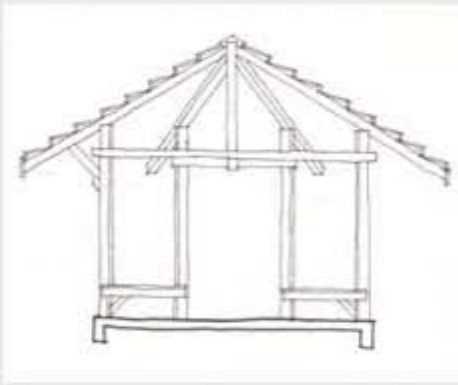
Site n.a.

Ground Floor n.a.

Total Floor 60' 190 m²

Costs n.a.

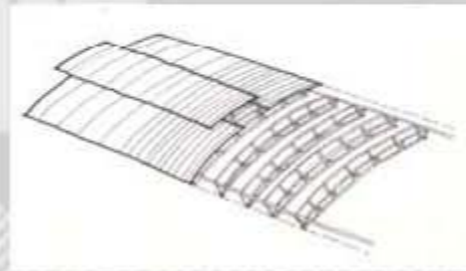
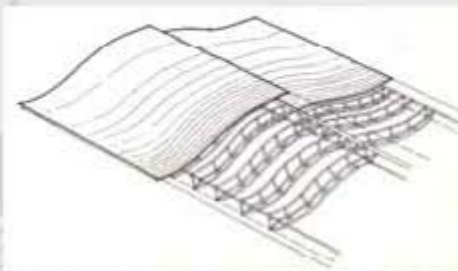
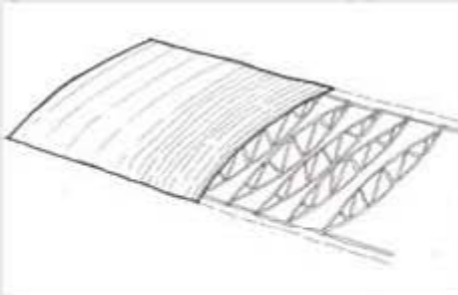
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The **design concept** of the LRT stations was influenced by the traditional Malay 'wakaf' or wayside rest stop, routinely found dotted along routes between towns and villages. The 'wakaf' generally comprised simple exposed timber structure with open plan and sides, occasionally resting on stilts and possessing layered roofs. This has been translated to the LRT Stations representing the 'wakaf' while the train becomes the 'journey' undertaken.

Curved roofs were derived from the simple exposed fish-belly shaped trusses of the at-grade station train platforms. This arose from the need to channel water away from the tracks while allowing sufficient clearance for the passage of the LRT.

Steel and curved elements were used to project a progressive, forward-looking and modern interpretation of tropical architecture while being sensitive, sympathetic and responsive to the **tropical** environment as well as projecting a consistency in architectural order, language, identification and unity. On larger roofs, heat is channelled through convection currents escaping through the jack roof above.



Tiwangsa Station



Bukit Jalil Station



Sri Petaling Station

KUALA LUMPUR LIGHT RAIL TRANSIT SYSTEM 1 (PHASE 1 & 2)



PWTC Station



Tasik Selatan Station



Sri Petaling Station



PWTC Station

The utilisation of **simple** and clear layouts with open plan and exposed structure resting on columns, along with the layered roofs of the LRT stations encourages natural cross-ventilation, takes advantage of natural day-lighting and vistas of surroundings. Extensive utilisation of natural lighting and ventilation in the stations excludes the need for artificial illumination and ventilation, reducing **energy consumption**.



Tasik Selatan Station



Sentul Station

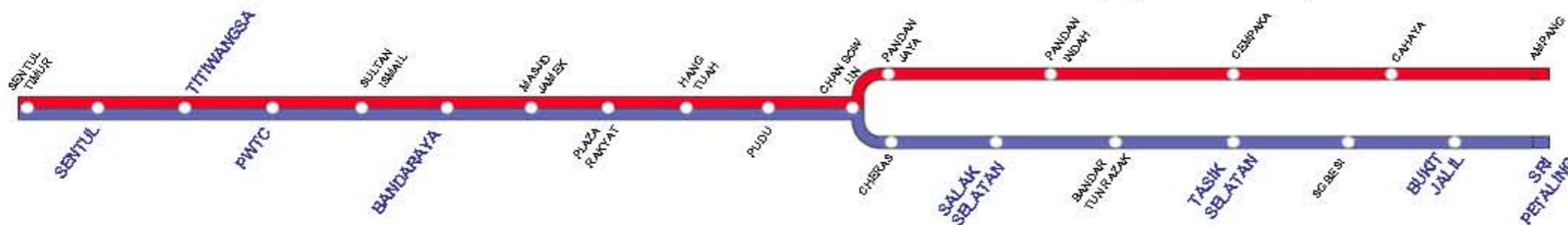


Salak Selatan Station

Steel and expressed trusses were used to take advantage of the large-span capabilities of steel in the vestibule and train platform with **minimal** columns and obstructions for passenger movement. This **openness** creates spacious stations and makes a satisfying experience for passengers waiting for the next train to arrive. The location of the stations has made the LRT stations unifying **nodes** of the city.



Bandaraya Station



Bukit Jalil Station

3198.MAL

KUALA LUMPUR LIGHT RAIL TRANSIT SYSTEM 1 (PHASE 1 & 2)

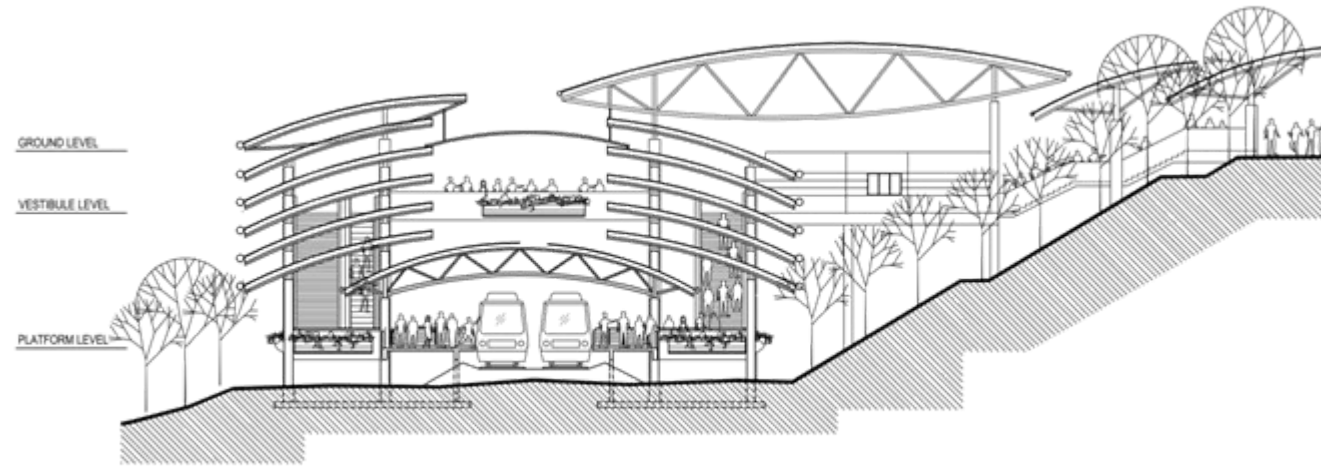
SRI PETALING STATION

Located adjacent to the Commonwealth Games Village, this station is accessible through the Games Village Access Road. The station consists of two platforms; a vestibule area about 7 metres above the platforms and a covered footbridge connecting the vestibule to the platform over the tracks. Service rooms are located adjacent to the vestibule area, whilst equipment rooms are located off the platform beneath the vestibule. The platform is fully roofed allowing for a continuous strip opening in the middle of the roof over the tracks to enhance the natural day lighting and ventilation.

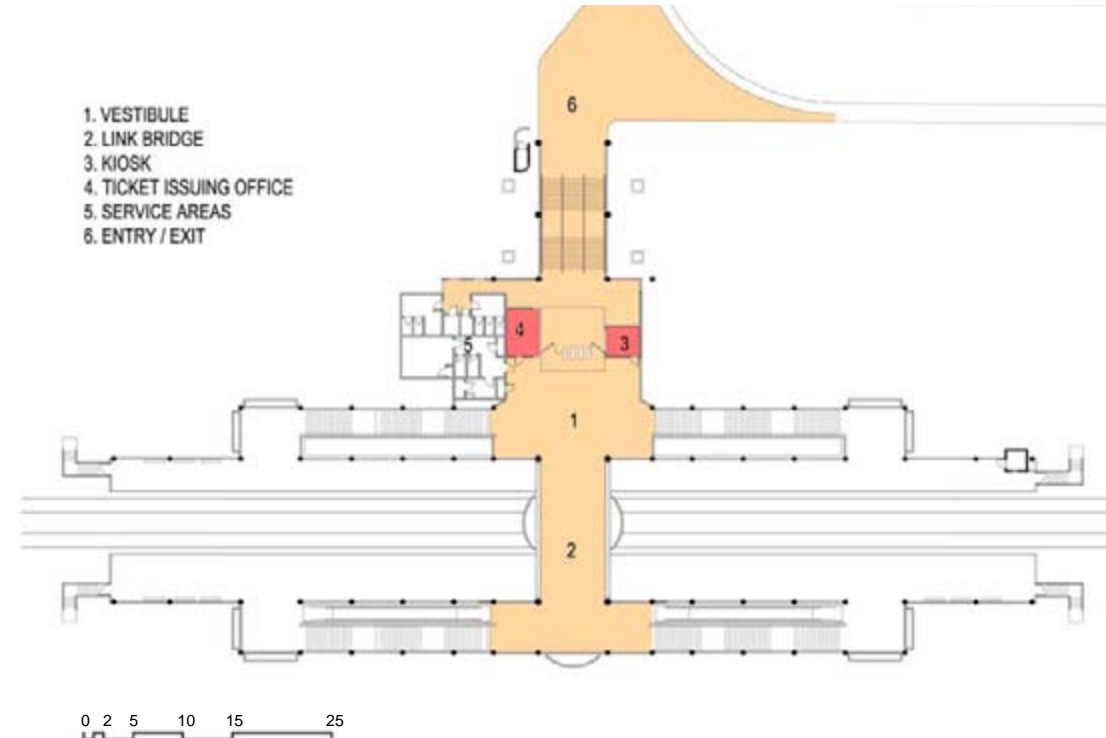
The commuter enters the station at a higher level and descends gradually to the platform. The entry porch consists of two curved roofs supported by steel 'finger' trusses while the steel trusses over the vestibule are a magnified and stretched version of the fish-belly truss. The architects have sought to design a structure in harmony with the hill where the station sits. The entrance is low-key and does not dominate its surroundings. The expressed steel structure is kept simple and the station enfolds like a book, as the commuter progresses through it, revealing more vistas within and without, as seen through the layered roofs. At night, the station lighting further reflects the strong directional movement through the station enhancing its powerful diagonal shape. From a distance, the station's proximity to the hill creates a fascinating play of geometric shapes, with the layered roofs over the stairs almost embracing the hill and becoming a logical extension of it.



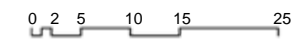
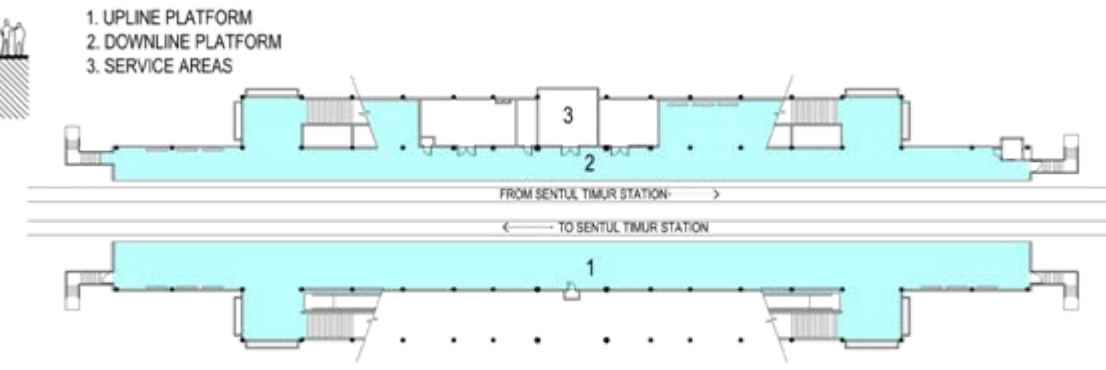
Sri Petaling Station



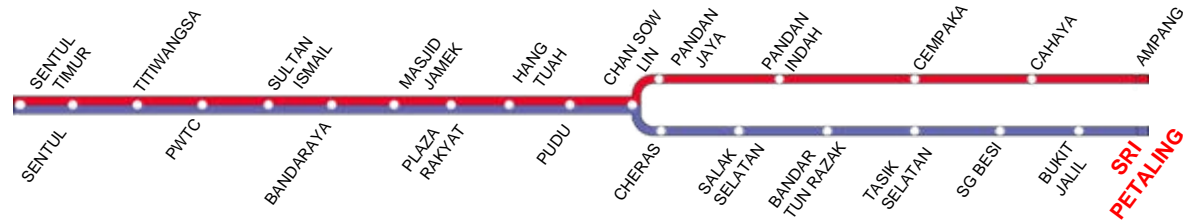
CROSS SECTION



VESTIBULE LEVEL PLAN



PLATFORM LEVEL PLAN



Sri Petaling Station- View from Southwest



Sri Petaling Station- View from Southeast

TASIK SELATAN STATION

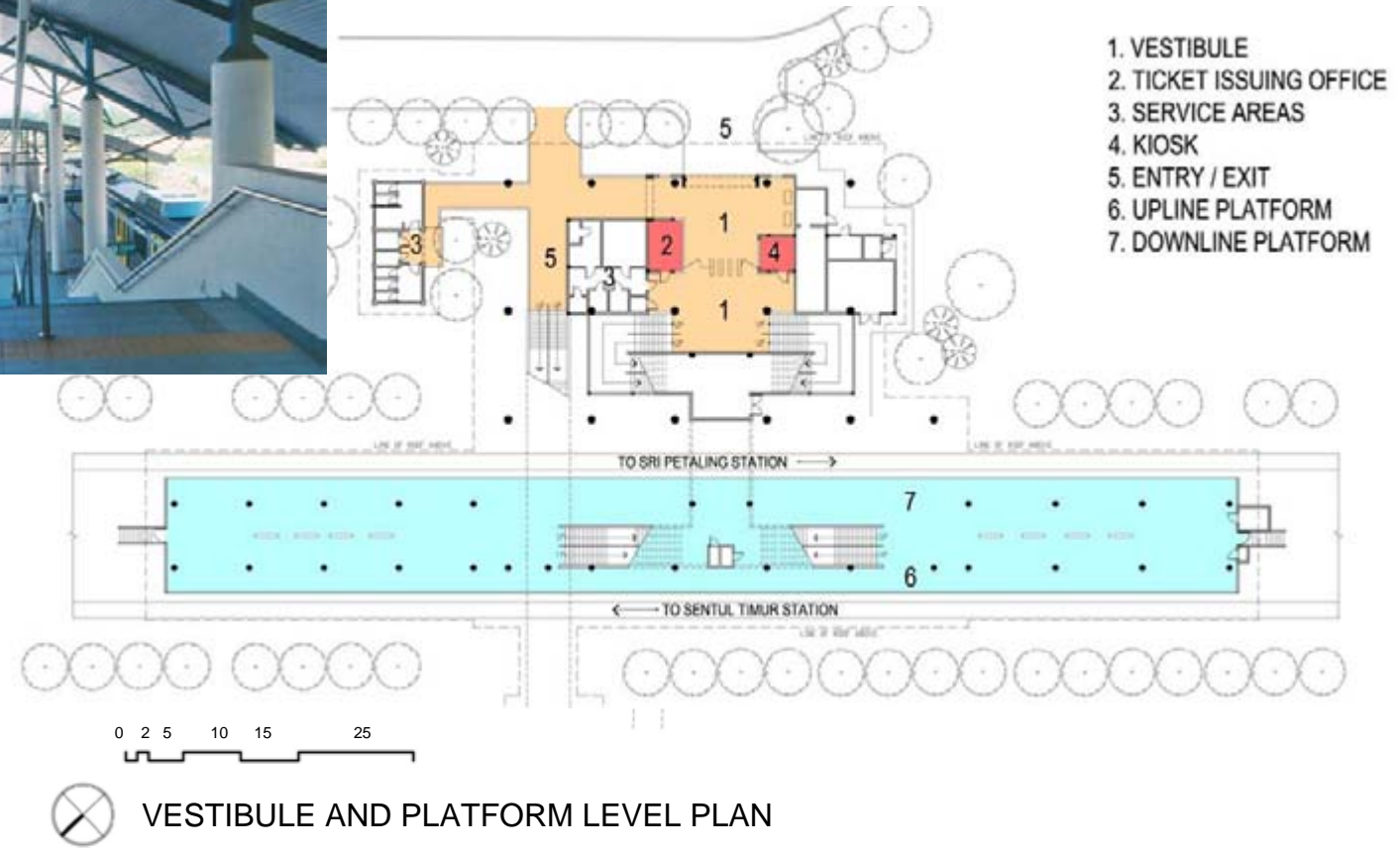
This station is located adjacent the Tasik Selatan Commuter Train Station, an intertown train line. There is an Express Rail Link Station nearby linking Kuala Lumpur International Airport to the city. A separate footbridge passing within the station connects to the commuter train station. This at-grade station structure comprises a central platform, a vestibule area and a footbridge linking the vestibule and train platform with stairs. The vestibule area, which includes service rooms, is set at the same level as the platforms. The layout of this station and the elongation of the station from entry to platform presented an opportunity to transmute the theme of the curved roof to expressed double-curved trusses over the vestibule. This curve reflects the dynamic nature of the train journey. It also further reinforces the journey of the commuter through the station. Over the platform, the roofs assume a single curve, layered one over another. The wide entrance and the curve of the double-curved vestibule roof, along with the simple, uncluttered and layered roofs sweeping one over the other presents an image of the station roofs which are seen to ripple through the wind. It resembles a living, breathing entity moving in harmony with the gentle breeze, which wafts steadily through the station.



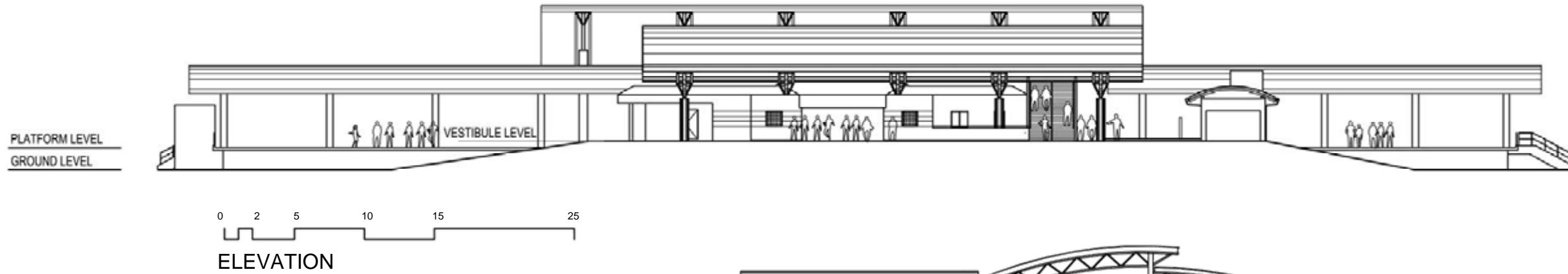
Tasik Selatan Station- View from entry walkway



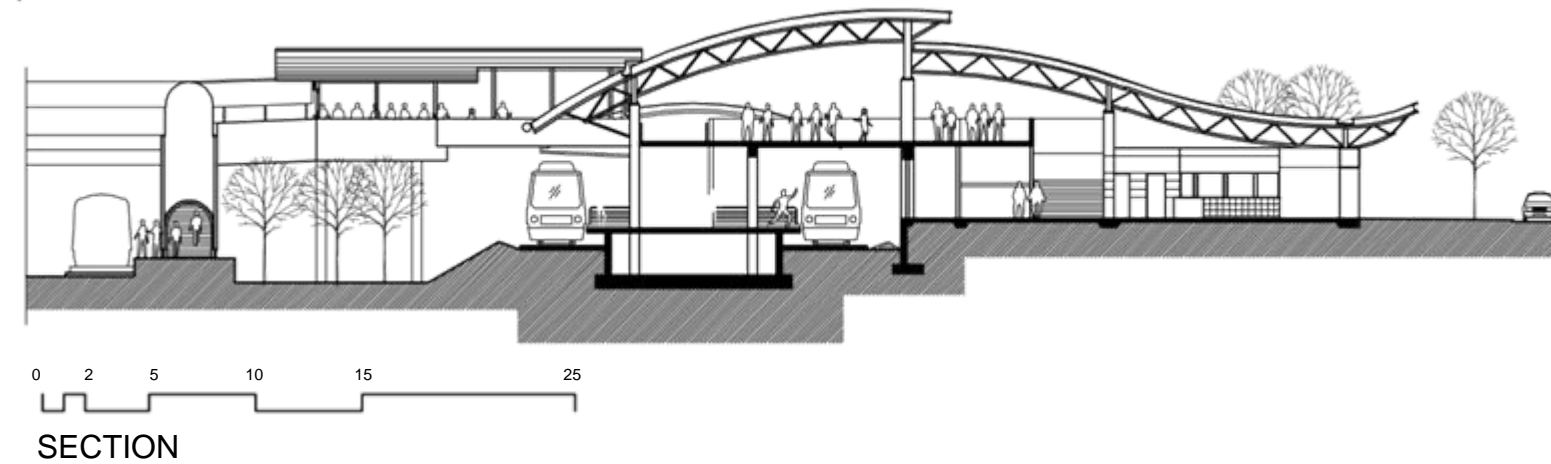
Tasik Selatan Station- Interior view



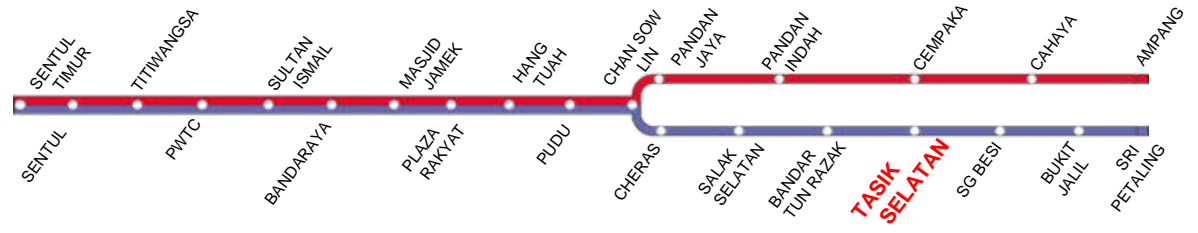
VESTIBULE AND PLATFORM LEVEL PLAN



ELEVATION



SECTION



TITIWANGSA STATION

This elevated station is located adjacent the Pekeliling Flats and connected across the road from the Pekeliling Bus Station by a covered footbridge. It has two elevated platforms and an elevated vestibule beneath it. Stairs and escalators link the ground to vestibule and from vestibule to platform. Part of the vestibule and platform overhangs Gombak Rivers and this is supported by tapering cantilever beams located along the river wall. This station's curved roof truss has permutated and expanded to an arching 3-dimensional v-shape in order to span both platforms. Layered roofs particularly over the stairs impart a rhythmic motion and presents a sleek, light and modern building filled with motion and vibrancy: it is a reflection of the busy streetscape below.



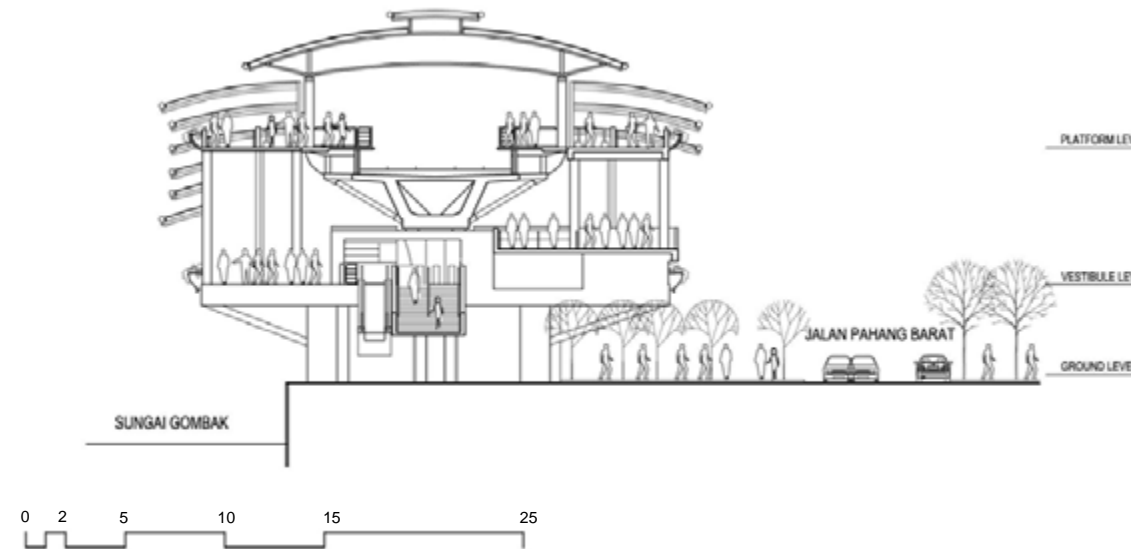
Titivangsa Station from Tun Razak Road



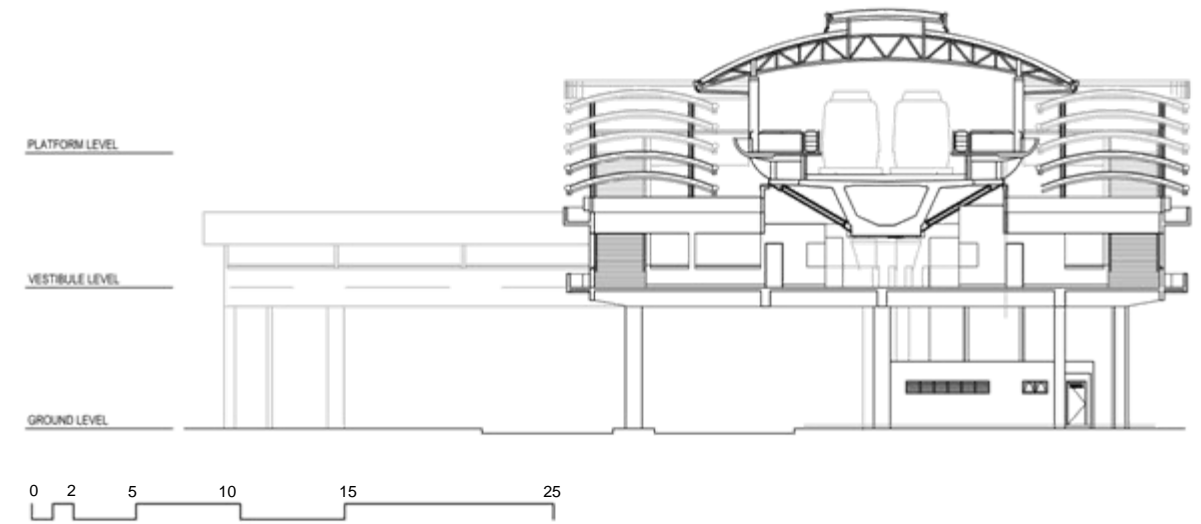
Sentul Station at night

SENTUL STATION

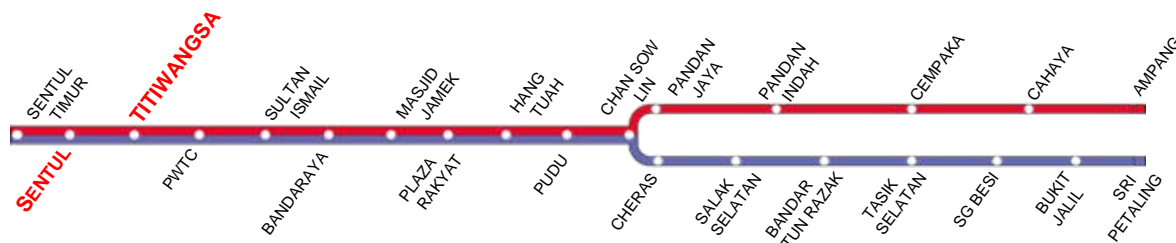
This elevated station layout is basically similar to Pekeliling Station. A road runs partly under the station. A covered footbridge provided with stairs and escalators span across the road and connects to the vestibule. The curved arching roof over the platform and layered roof over the stairs leading from the vestibule to the platform are similar to Pekeliling Station. The station imparts the impression of rhythmic motion, almost like a large bird about to take flight.



CROSS SECTION



CROSS SECTION



Titivangsa Station



Titivangsa Station from Gombak River

SALAK SELATAN STATION

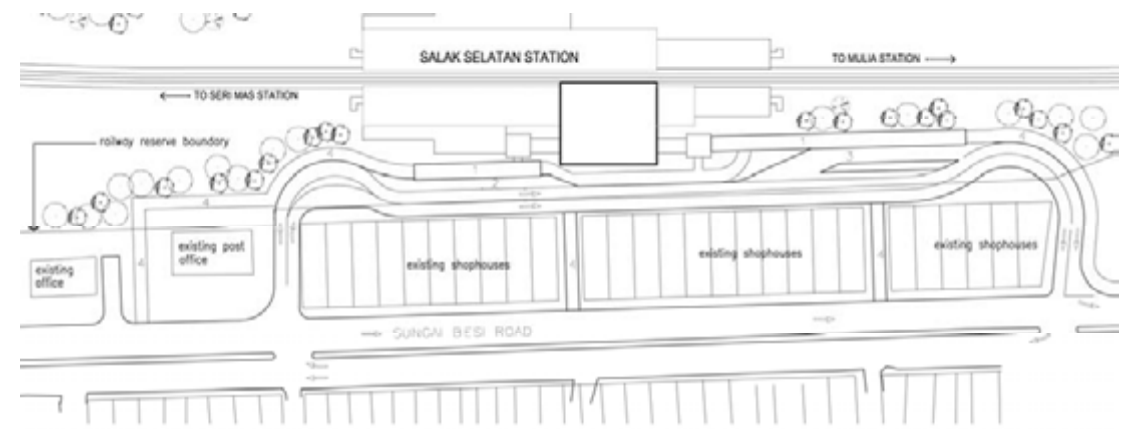
This is an at-grade station, located behind several rows of existing pre-World-War II shop-houses off Sungai Besi Road. A new access road serving the station is provided with bus and taxi laybys. The station has two train platforms, a vestibule area including service rooms and a separate subway with stairs and ramps for fare-paying passengers and general public respectively. The station design has been kept simple, non-obtrusive and not dominating its surroundings. The basic fish-belly roof truss over the station platform expands to a larger version denoting the vestibule area where passengers converge. The entrances to the station have reinforced-concrete porches, which reflects the solid quality of the adjacent shop-house entrances. They also act as a transition between the surrounding buildings and the curved metal roofs of the station.



Salak Selatan Station- Night scene



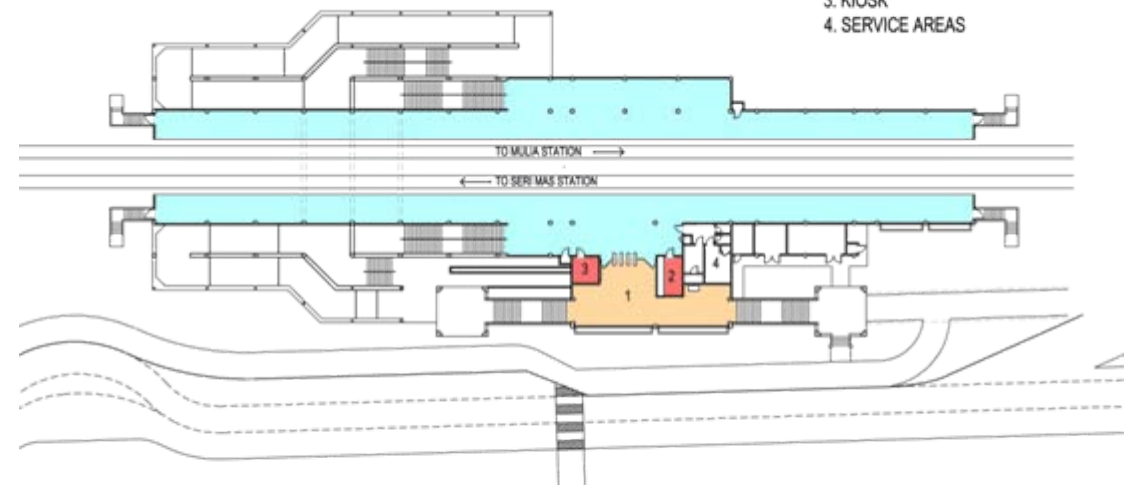
Salak Selatan Station- View of platform



0 2.5 10 15 25

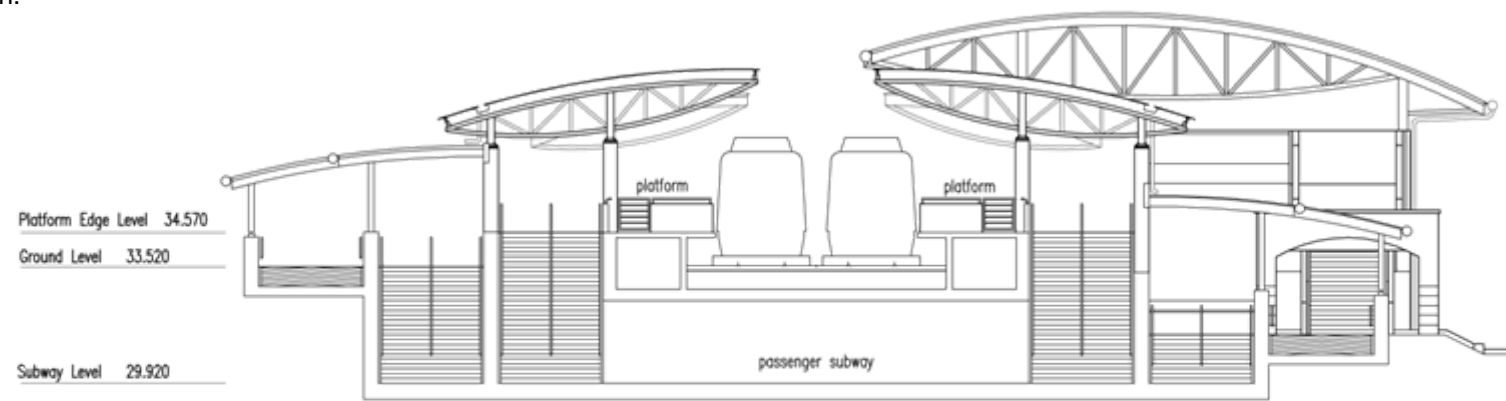
SITE PLAN

- 1. VESTIBULE PLATFORM
- 2. TICKET ISSUING OFFICE
- 3. KIOSK
- 4. SERVICE AREAS



0 2 5 10 15 25

VESTIBULE/PLATFORM LEVEL PLAN



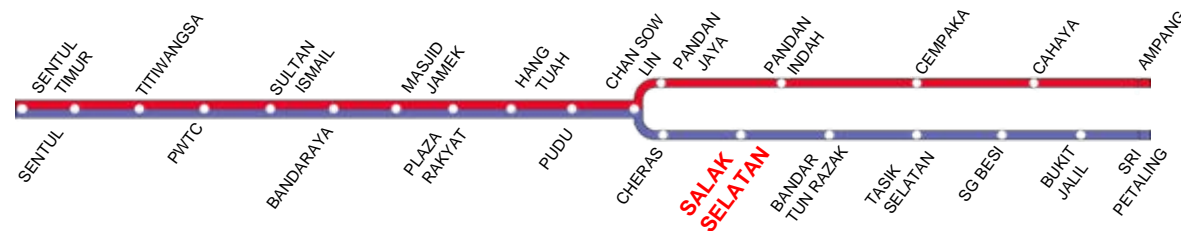
Platform Edge Level 34.570

Ground Level 33.520

Subway Level 29.920

0 2 5 10 15 25

SECTION

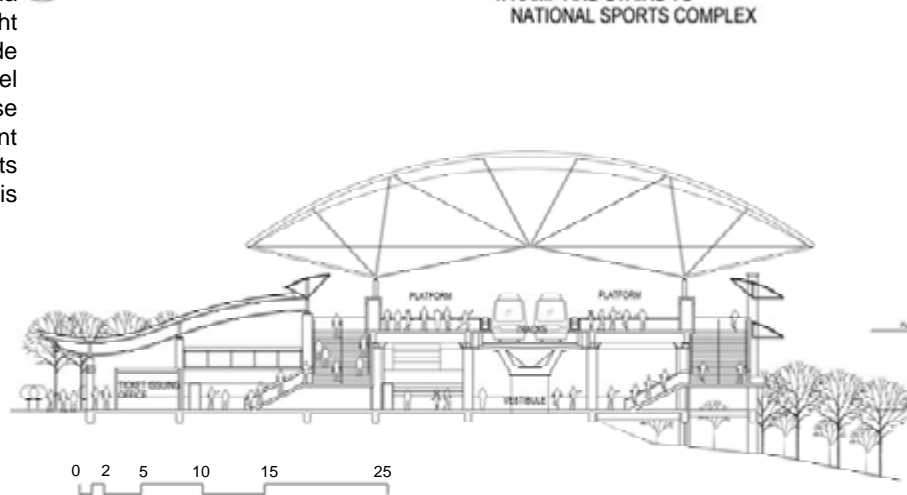
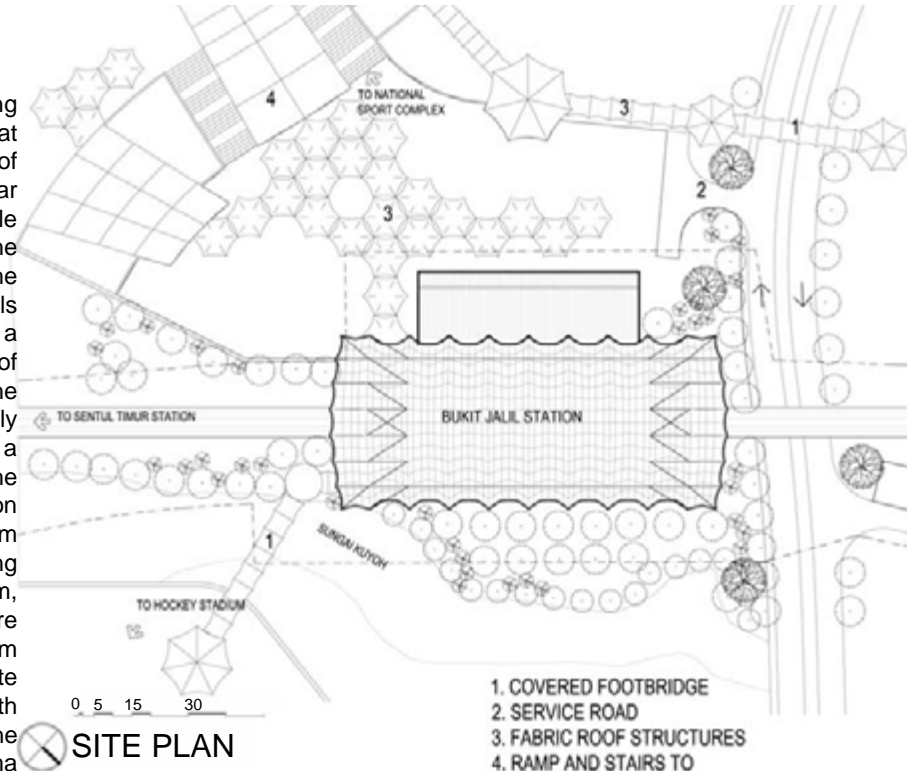


KUALA LUMPUR LIGHT RAIL TRANSIT SYSTEM 1 (PHASE 1 & 2)

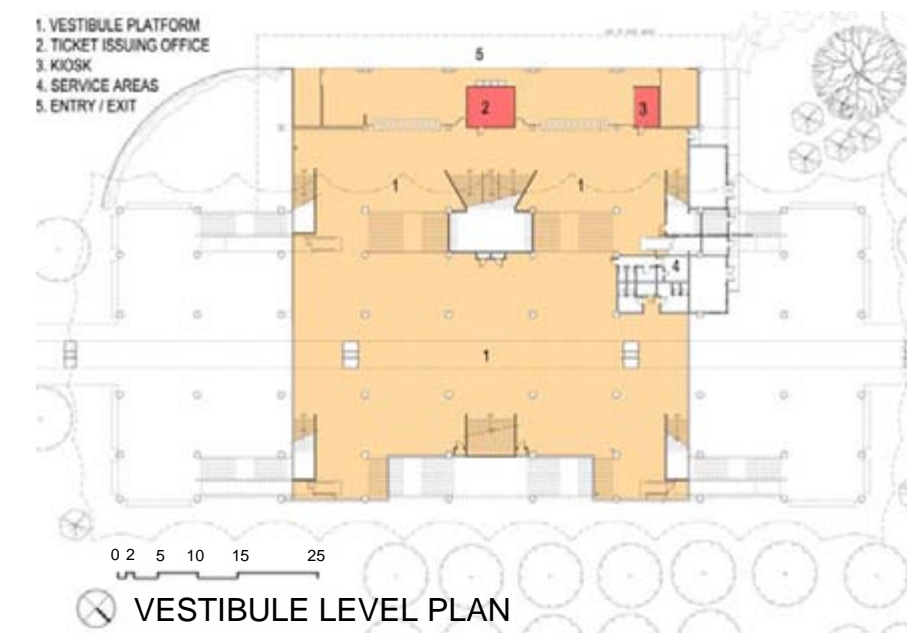
BUKIT JALIL STATION

This station is located down the hill from the Bukit Jalil stadium. A large plaza and a broad staircase connect it to the Stadium. This elevated station comprises two platforms over 9 metres wide with service rooms at the vestibule level. Stairs and escalators are provided from the vestibule level to each platform. The vestibule has an insulated metal roof on exposed double-curved tubular metal trusses. The platform roof structure consists of bow-shaped steel trusses spanning 46 metres. These are supported by groups of inclined tubular steel props that fan out from the tops of the steel columns on the platform. A series of membrane panels are tensioned onto this frame. These are fabricated from PVC coated polyester fabric, using 'Preconstraint 1202' fabric, with 'Fluotop' polymer coating which enables the fabric to be self-cleaning. The roof was deliberately selected to blend with the membrane-roofed structures in the Bukit Jalil Sports Complex. The membrane roof diffuses the sunlight on the platform during the day, while giving a soft glow during the night from the upward throw (40% upwards, 60 % downwards) of the high-powered lamps below. This is the largest of the stations, catering for the large crowds expected major sporting events. The collaborative effort between the architects and engineers Ove Arup and Partners International with Arup Jururunding Sendirian Berhad worked very well in this station, given the complex structural issues involved.

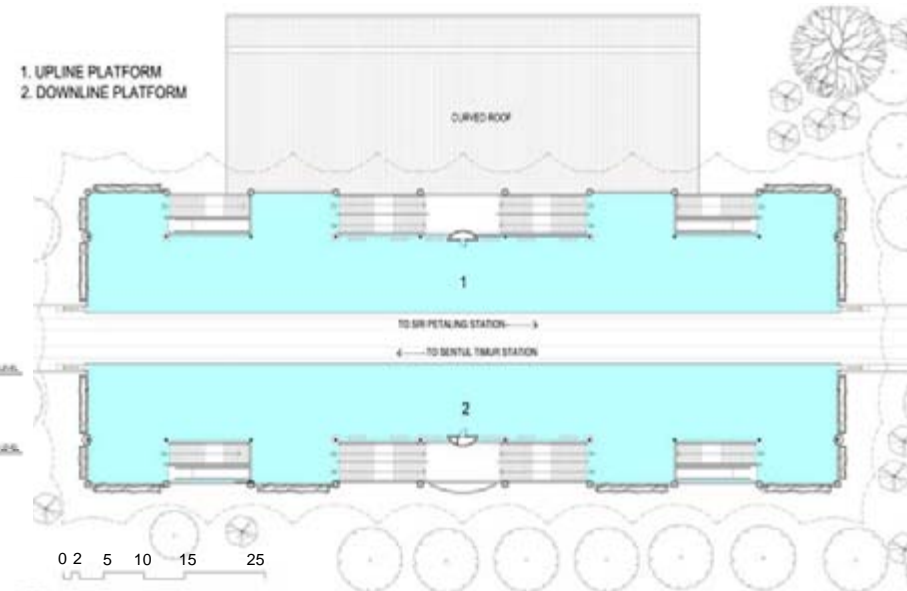
The architects have sought to give the feeling of expansiveness, expectation and drama that accompanies sports events. Hence, the use of large spaces where columns are spaced far apart, the use of a progressively rising double curved metal roof with expressed trusses at the vestibule and delicate steel structure of the membrane roof. Strong lines and diagonals formed by the stairs and escalators lend a dynamic sense of movement while the use of sun-breakers articulate and enliven the elevation. The curved membrane roof is not only curved in section but in 3-dimensions and is a logical evolution of the simple curved roof of the at-grade station train platform. The progression of the visual drama from the entry begins from the cool shaded vestibule with its roof arching upwards, drawing the eye towards the platform, which is bathed in light. The steel structure supporting the membrane roof at the platform does not overwhelm despite being quite complicated. It takes part in the play of light with its delicate filaments reaching to all sides of the roof, evoking a great sense of space and drama to the large open-sided platform area. At night the station is bathed in light from the halide lamps and from a distance twinkles like a jewel in the night. The solid reinforced concrete base with its strong lines and diagonals complement the delicate steel structure above, embracing its site and surroundings resulting in a station that is visually stunning and satisfying.



CROSS SECTION



VESTIBULE LEVEL PLAN



PLATFORM LEVEL PLAN



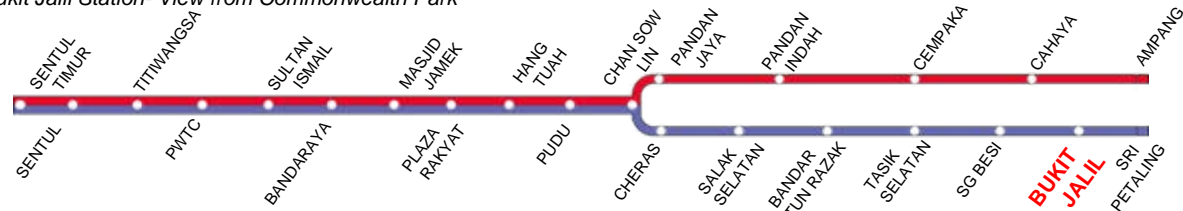
Bukit Jalil Station- View from Commonwealth Park



Bukit Jalil- View from approach road



Bukit Jalil- Night scene



PWTC STATION

Located over Gombak Rivers, adjacent to Putra Place Shopping Centre and across the road from the Seri-Pacific Hotel and Putra World-Trade Centre, this elevated station, although simple in appearance, was actually quite complex and difficult to construct. The station and viaduct are supported by two massive concrete beams straddling Gombak River over the span of 35 metres each. The station is also supported on tubular steel trusses and steel I-beams. Curved steel elements have been adopted for the roof. The construction of the station is unconventional as the floors and staircases use precast concrete formwork. This method was adopted in order to shorten the construction time and eliminate the need for conventional formwork support systems over the river.

Glass screen is used between the vestibule and soffit of platform to allow light penetration whilst preserving views to the outside and providing protection from the elements. Gently rounded shapes are used as a foil to the mass of the concrete beams. The platform roof ends terminate with half-dish shaped aluminum roofs, which are the first of its kind in the country. The station has been conceived as a rounded, curvaceous foil to the hard angular buildings surrounding it. Its location over the river below bolsters its image as a ship about to be released from its moorings. With this allegory, the architects have reinforced the image by evolving the curved roofs supported by 3-dimensional steel trusses into an almost elliptical shape, while the roof ends have followed a half-dish shape, suggesting the hull of a futuristic vehicle. The curved roofs over the platform give unity to the station, while the motion of commuters seen through the expansive glass screen resembles the ship's passengers. The analogy of a ship or space ship is further enhanced by the use of strong colours on the tubular steel structure, looking like the landing gear of some futuristic vehicle.



PWTC Station- View from north east



PWTC Station- Interior view



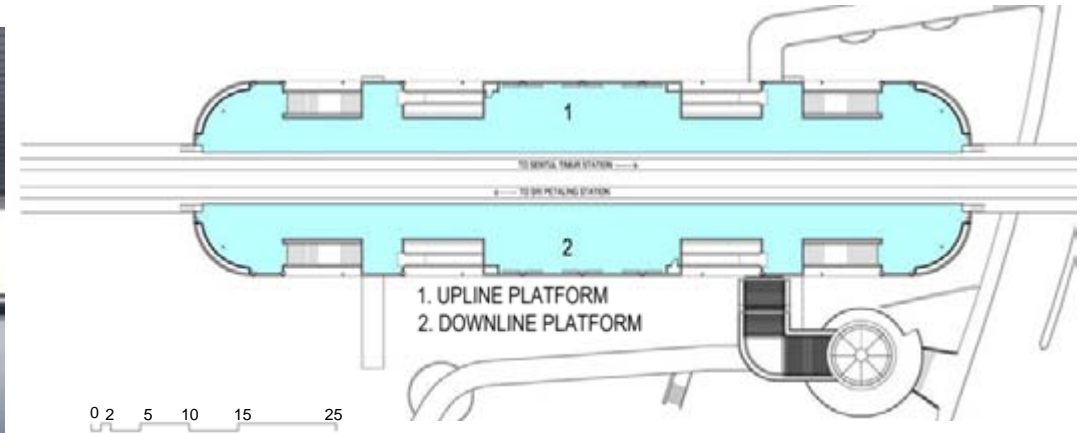
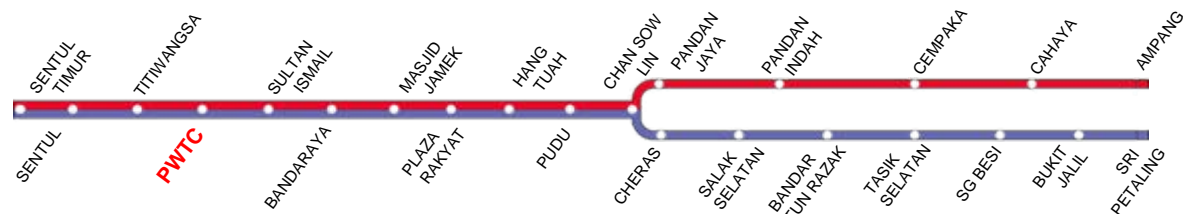
PWTC Station- View from Jalan Putra



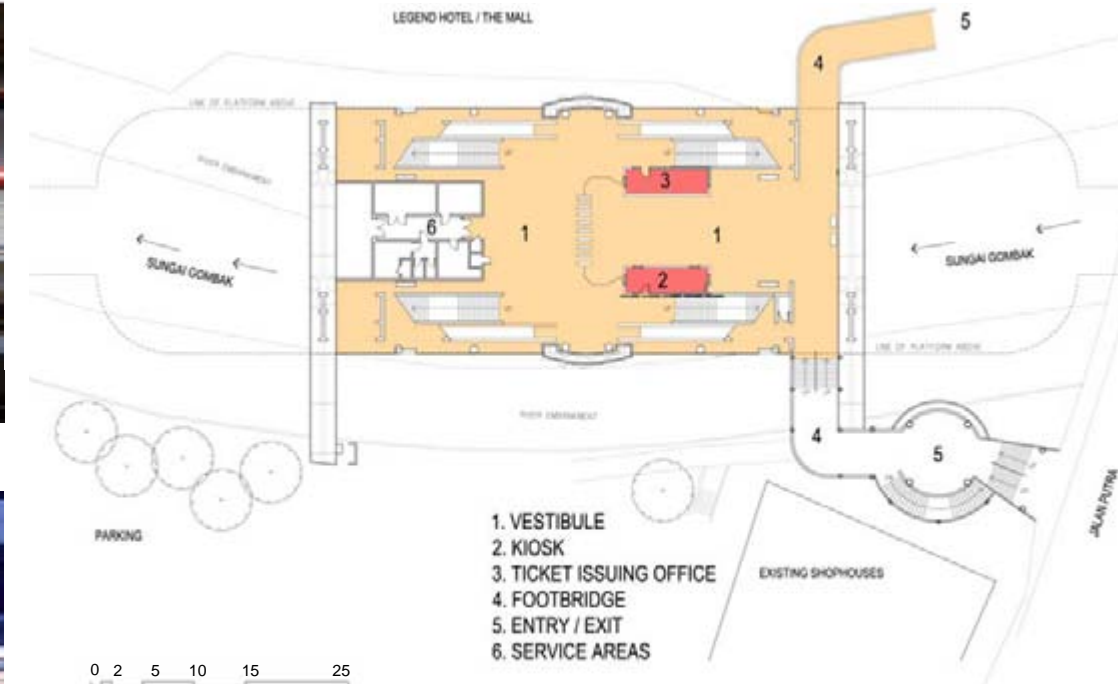
PWTC Station- View towards Gombak River



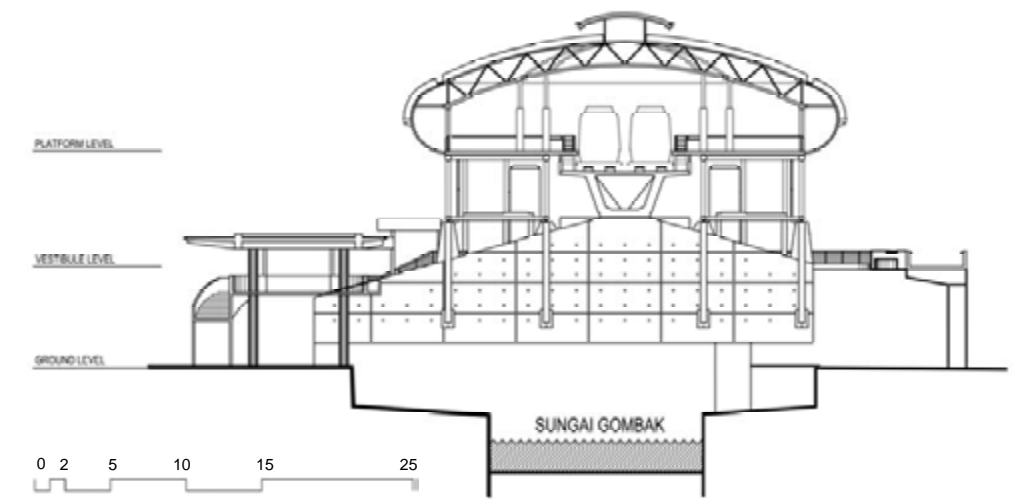
PWTC Station- Aerial view



PLATFORM LEVEL PLAN



VESTIBULE LEVEL PLAN



CROSS SECTION

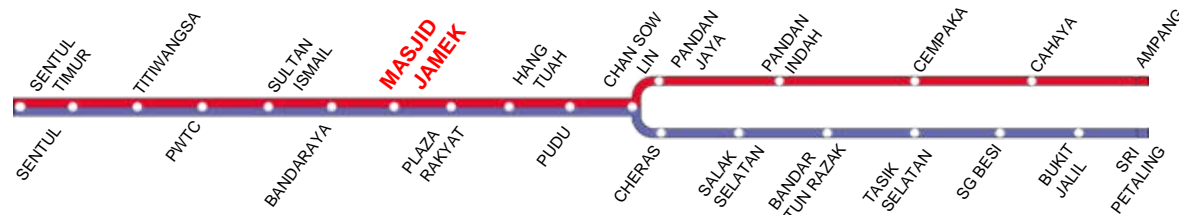
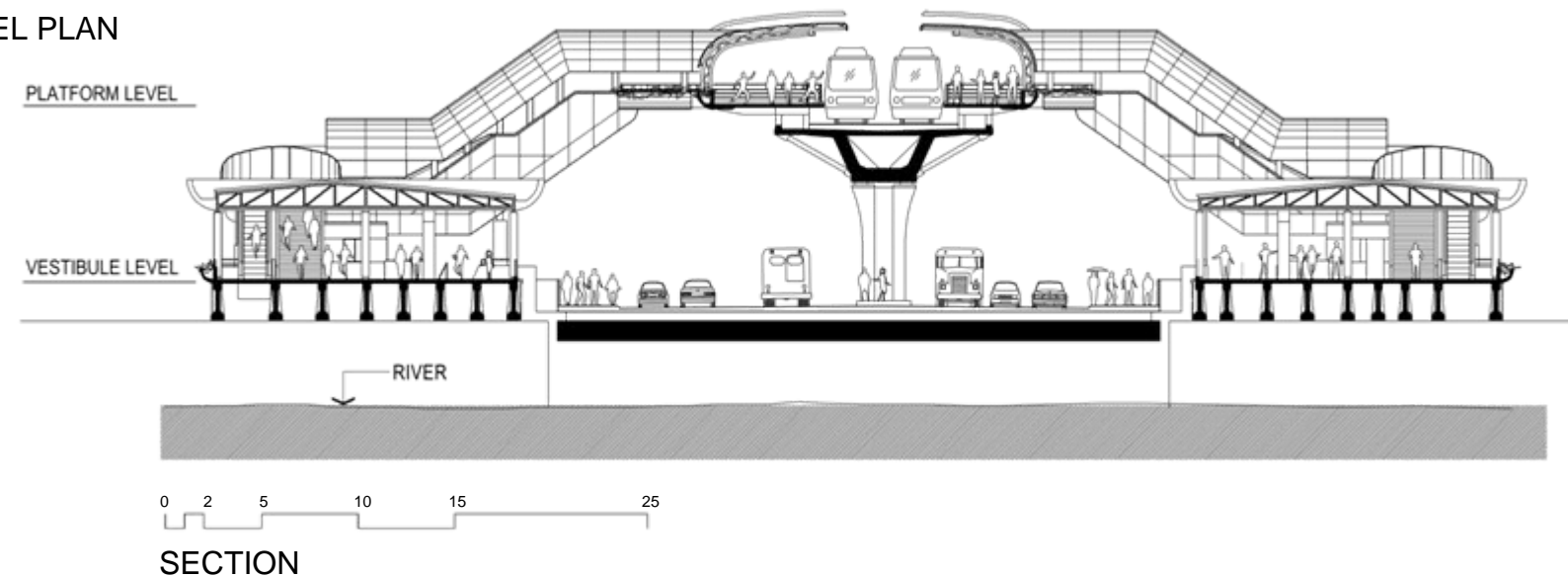
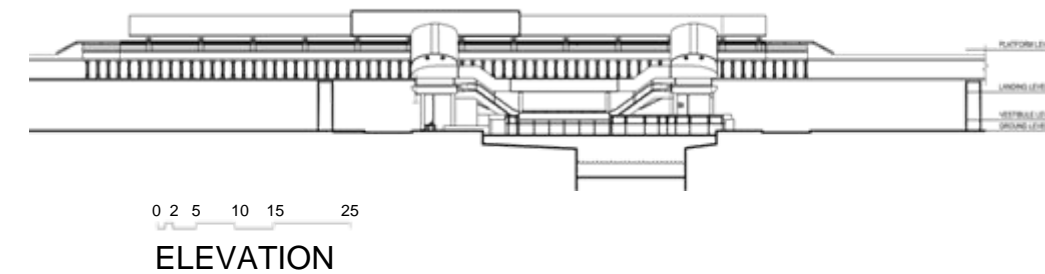
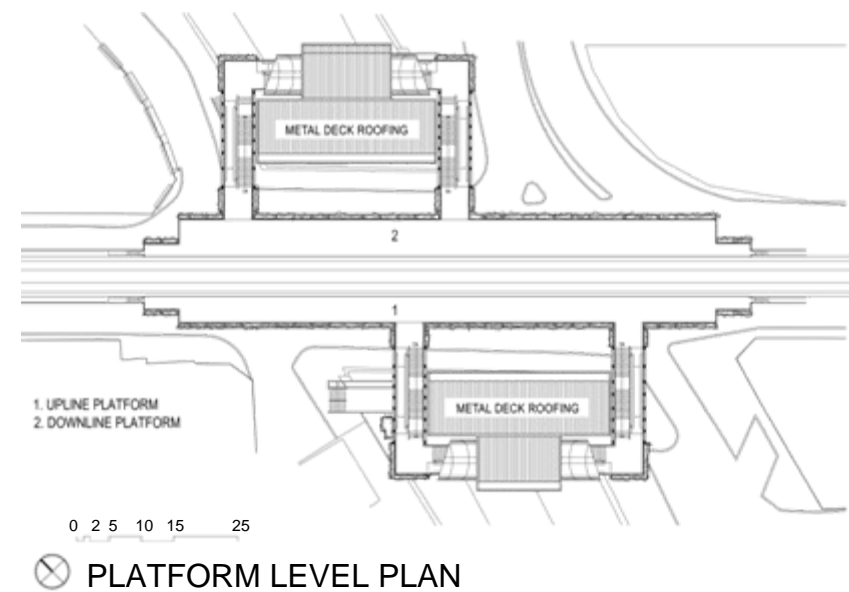
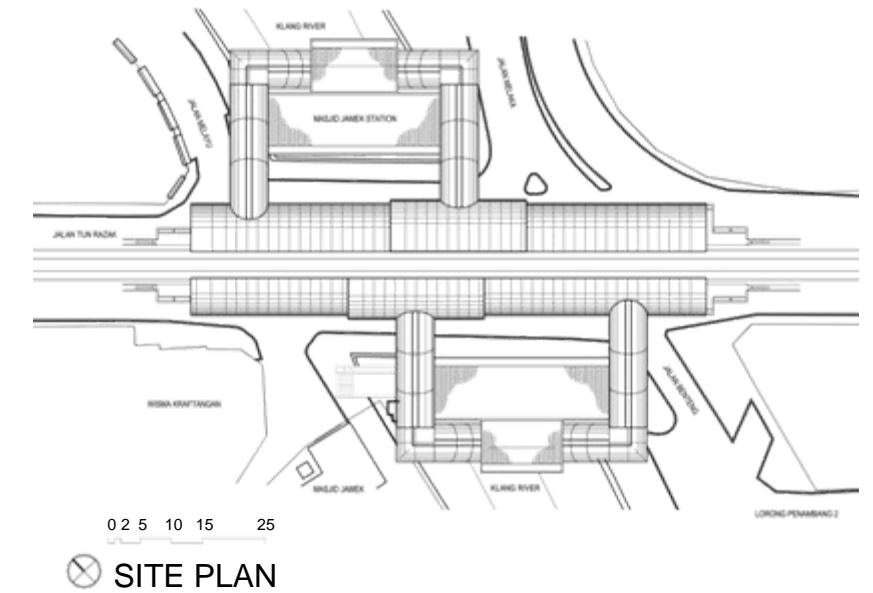
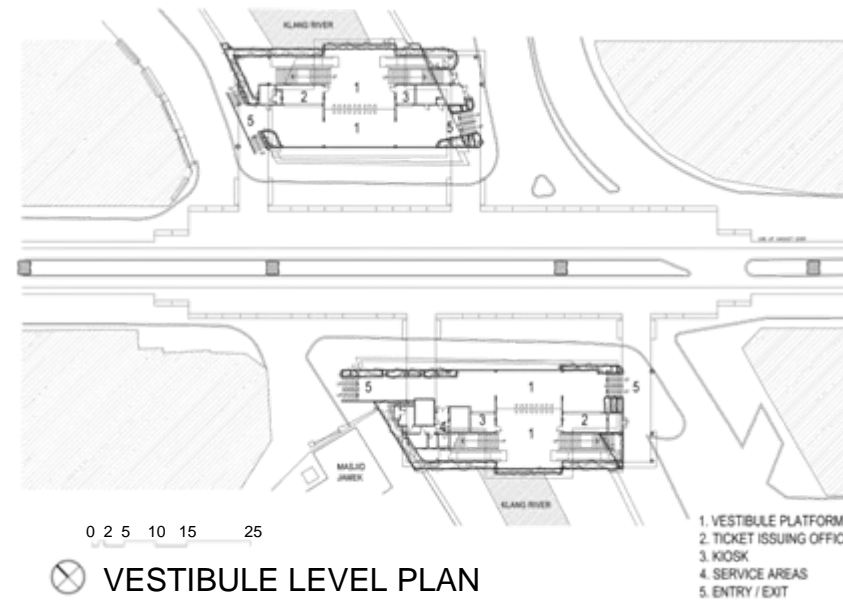
KUALA LUMPUR LIGHT RAIL TRANSIT SYSTEM 1 (PHASE 1 & 2)

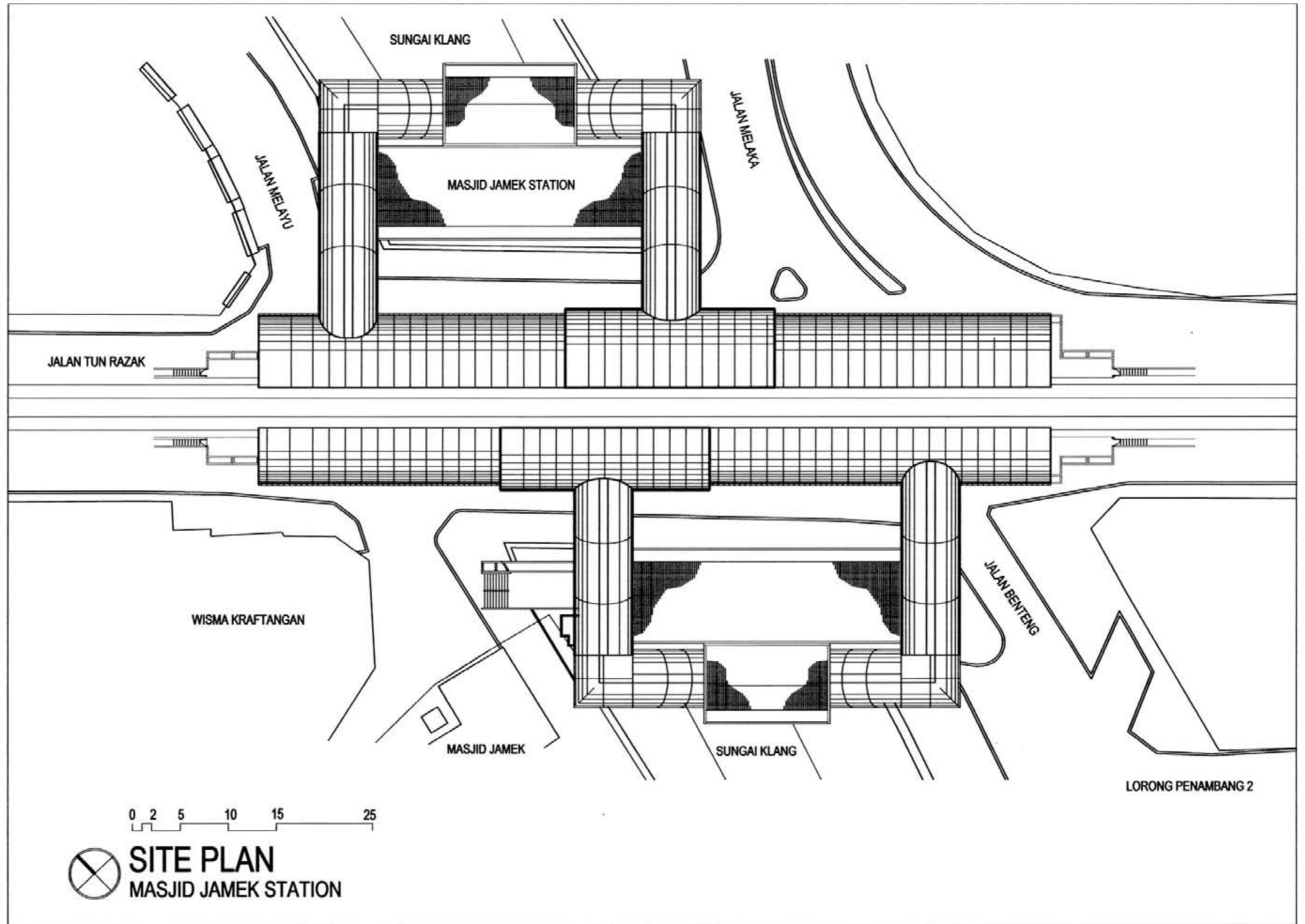
MASJID JAMEK STATION

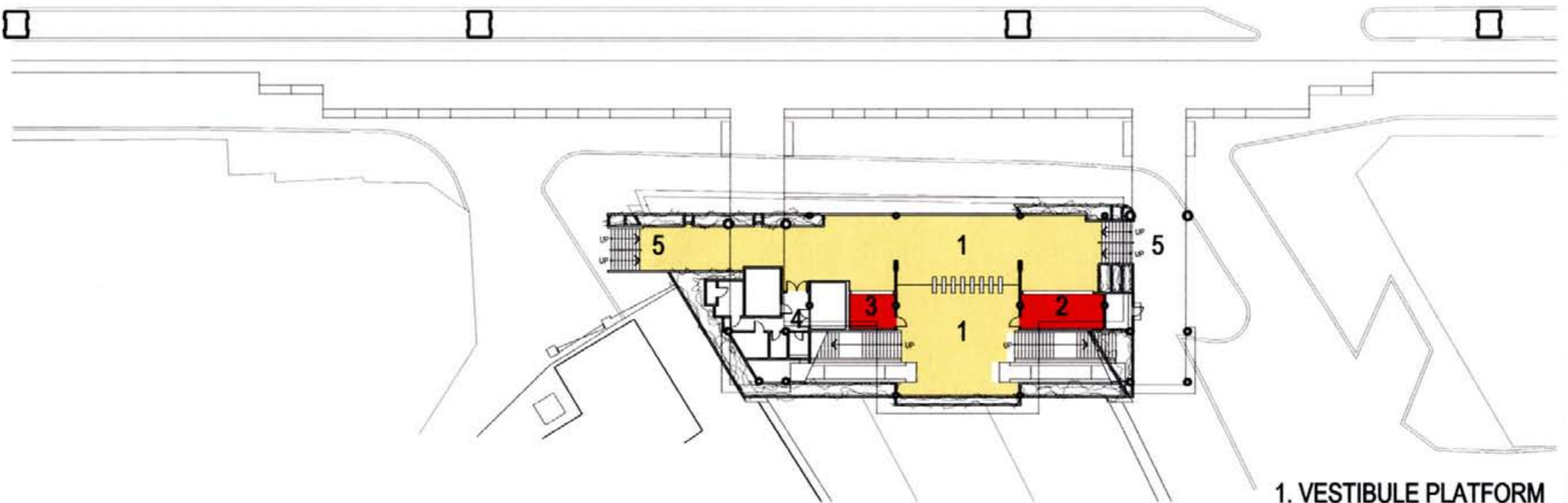
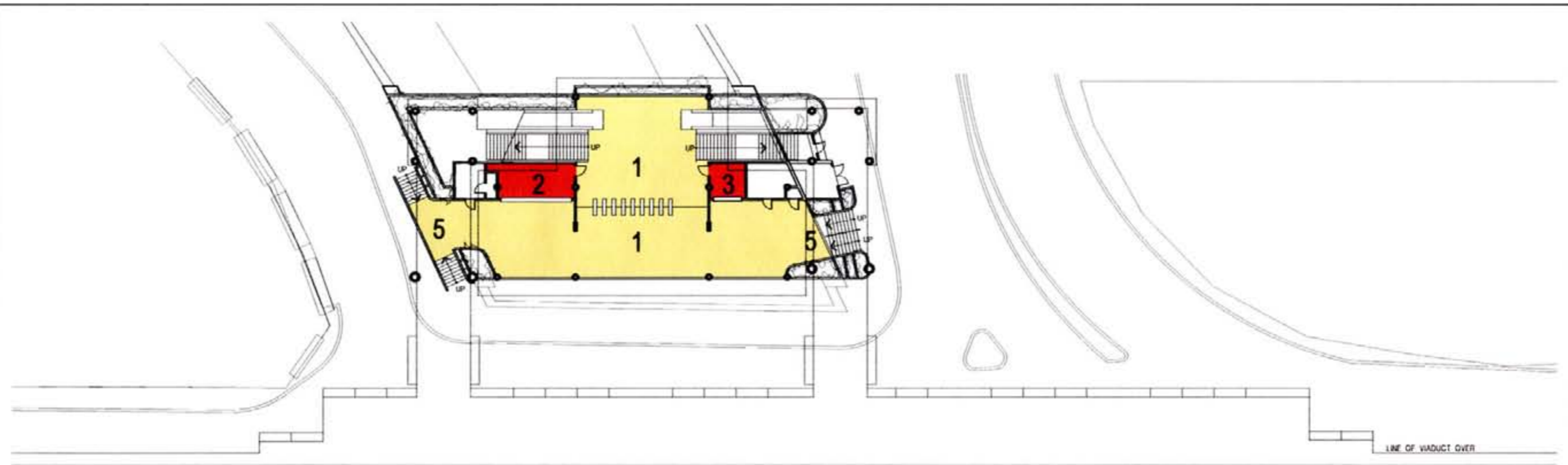
This is an elevated station built under Phase I spanning over Tun Perak Road and across the Klang River. There are two vestibules, one on each side of the road situated over the river. One vestibule is adjacent Masjid Jamek - the mosque located at the confluence of Klang Rivers and Gombak Rivers from where the first settlements of Kuala Lumpur flourished and expanded. It is also our historically sensitive area due to the presence of several fine old buildings including the mosque nearby. The platforms are connected to the vestibules by means of stairs and escalators. The vestibules are directly accessible from the street by stairs. Service and equipment rooms are located at the perimeter of the vestibules, some opening directly to the street pavement.

This station has all the limitations and challenges of a problematic site, not only due to the reasons above, but because the station needed to be constructed over the Klang River. As a result, the station's viaduct and platform rests entirely on two piers which sit one on each side of the river along the middle of Jalan Tun Perak. As weight was a critical factor steel trusses and a GRP (Glass Reinforced Polymer) roof was used, the GRP roof being one of the first of its kind in size and complexity in the country. The proximity to Masjid Jamek led to the adoption of Islamic motifs and patterns elegantly realised in the GRP roof at the platform and in the GRC (Glass Reinforced Concrete) panels surrounding the base of the station.

The aim of the architects was to deliberately adopt a 'low-key' approach to the station design. The station and its roofs do not dominate the surrounding buildings and does not draw too much attention to itself. This was realised by purposefully keeping the roof low-slung, the use of curved elements and applying smooth transitions between the different sections of the station. The result is an unassuming, yet sleek and elegant station as it sits over the river and arches over the busy road below. The curved glass reinforced polymer roof appears lightly draped over the tubular steel trusses with its delicate Islamic motifs at the platform. Its continuity from stairs to platform acquires an almost liquid character. It is heavily used by commuters due to its location in a particularly busy part of the city. People have been drawn to it, using it as a meeting place, while some have been seen to peer out from the vestibule as spectators witnessing the action of the busy streetscape.



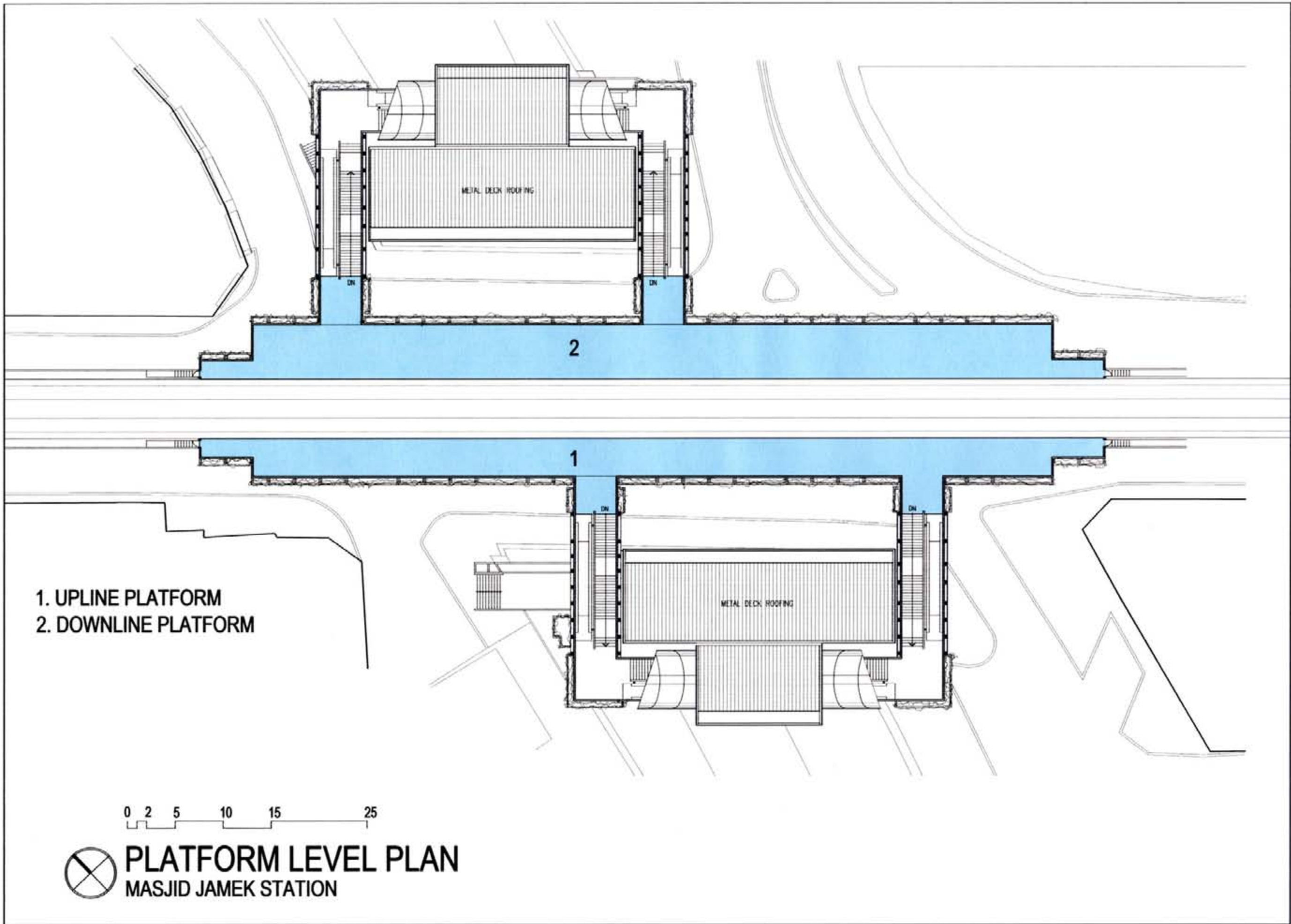


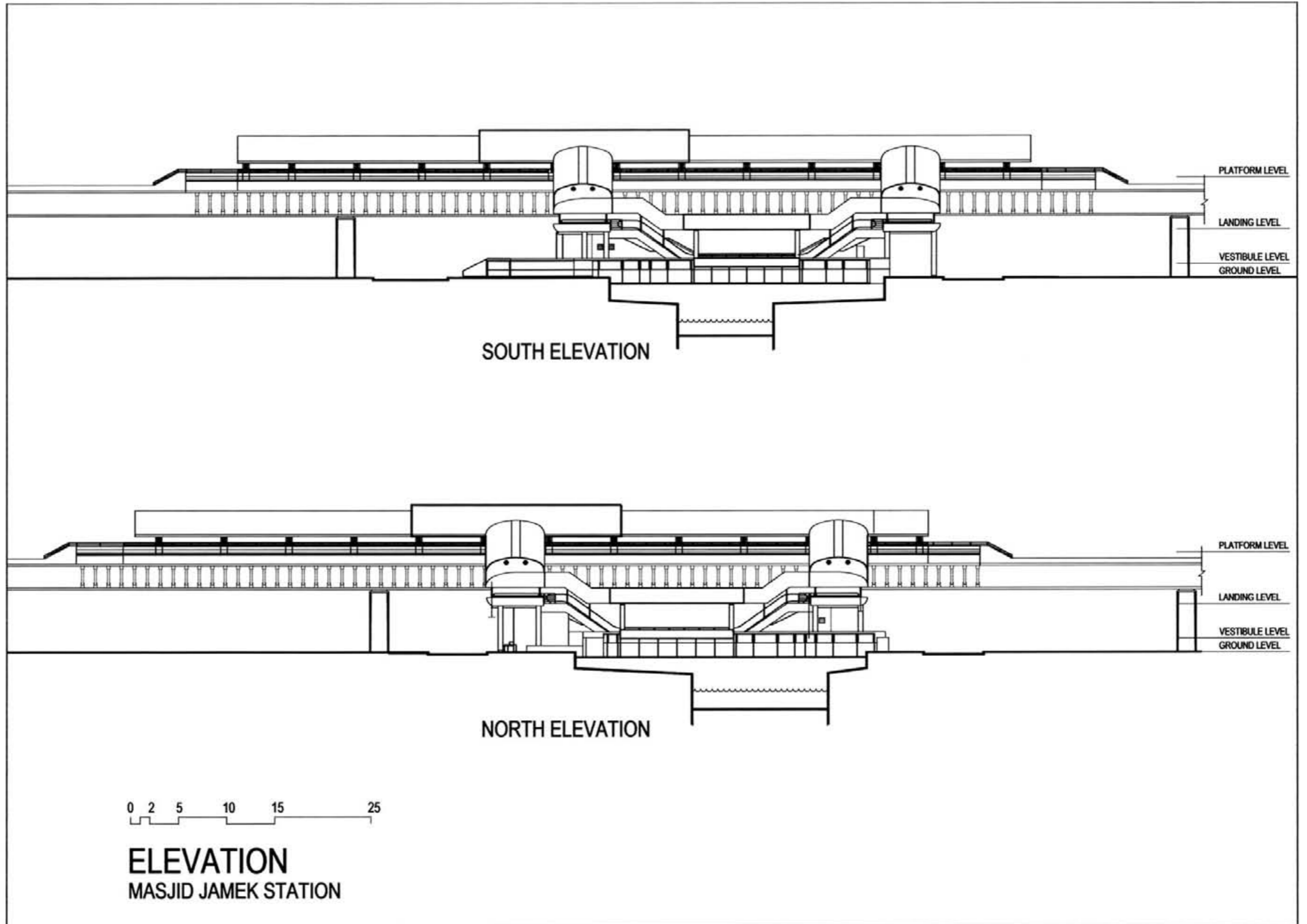


0 2 5 10 15 25

 **VESTIBULE LEVEL PLAN**
MASJID JAMEK STATION

- 1. VESTIBULE PLATFORM
- 2. TICKET ISSUING OFFICE
- 3. KIOSK
- 4. SERVICE AREAS
- 5. ENTRY / EXIT





SOUTH ELEVATION

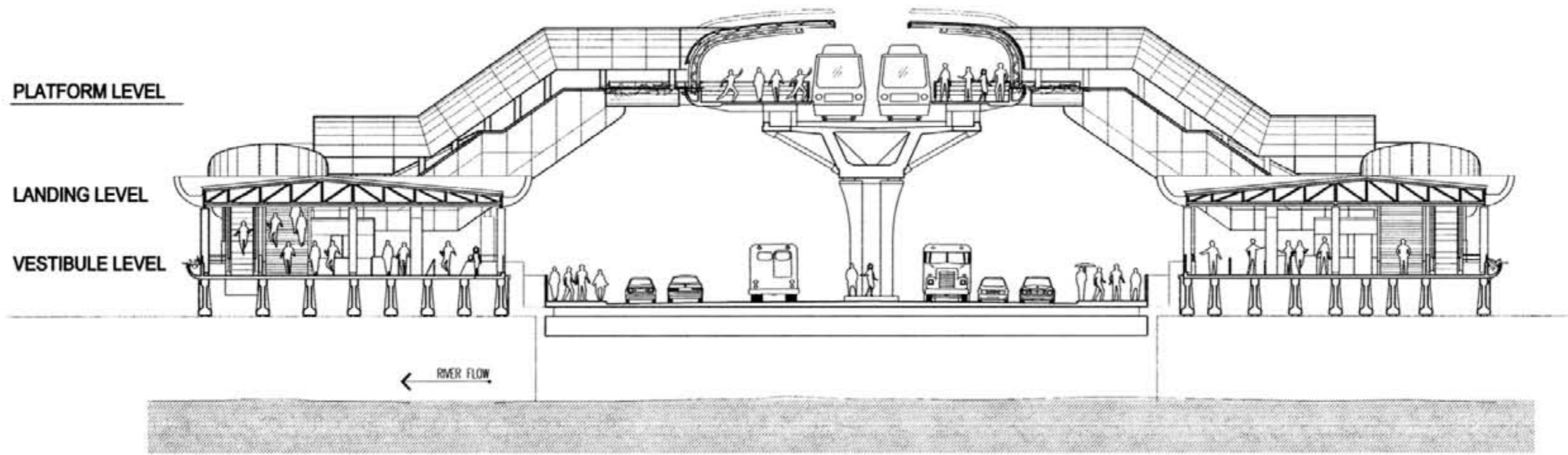
NORTH ELEVATION

PLATFORM LEVEL
LANDING LEVEL
VESTIBULE LEVEL
GROUND LEVEL

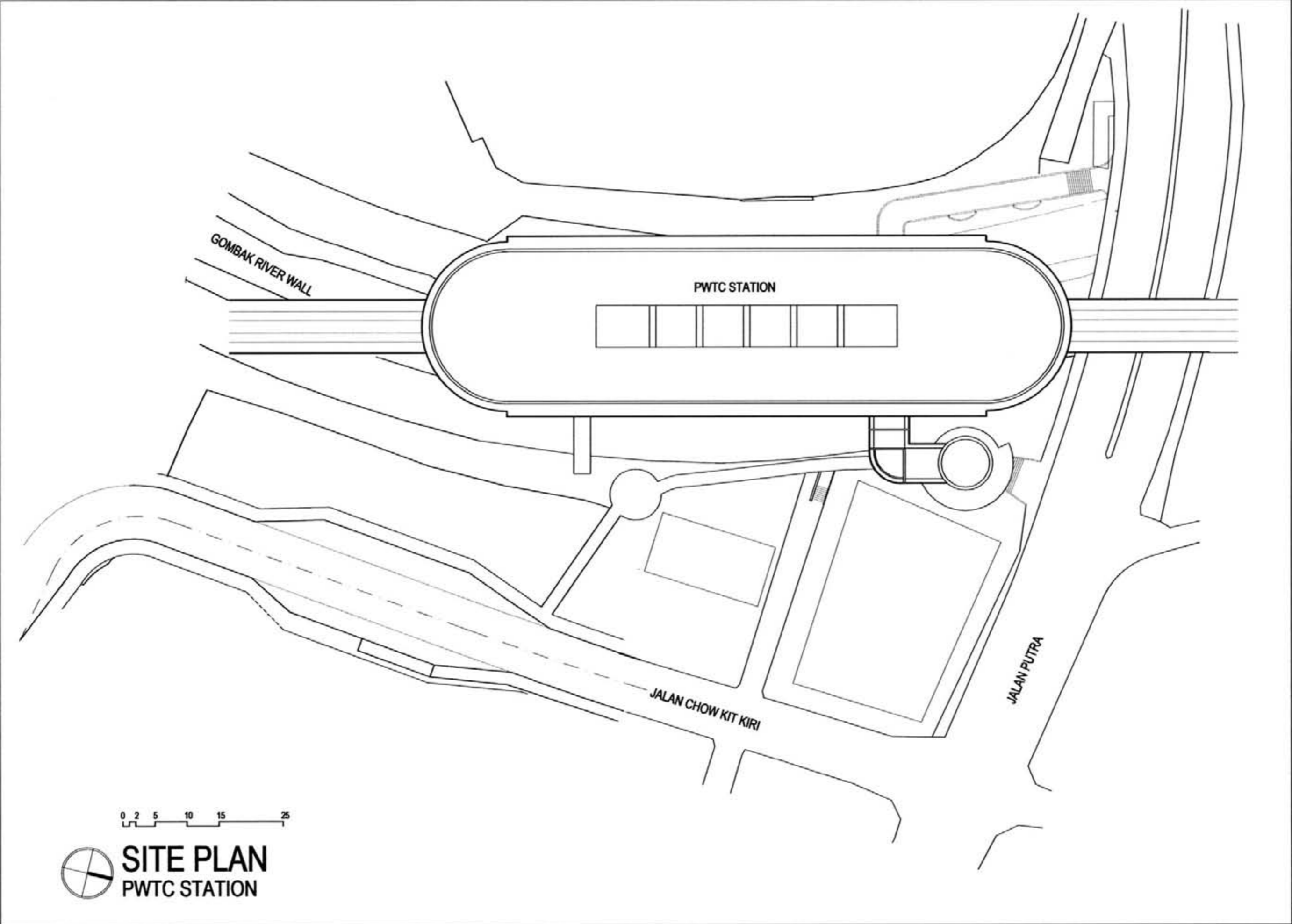
PLATFORM LEVEL
LANDING LEVEL
VESTIBULE LEVEL
GROUND LEVEL

0 2 5 10 15 25

ELEVATION
MASJID JAMEK STATION



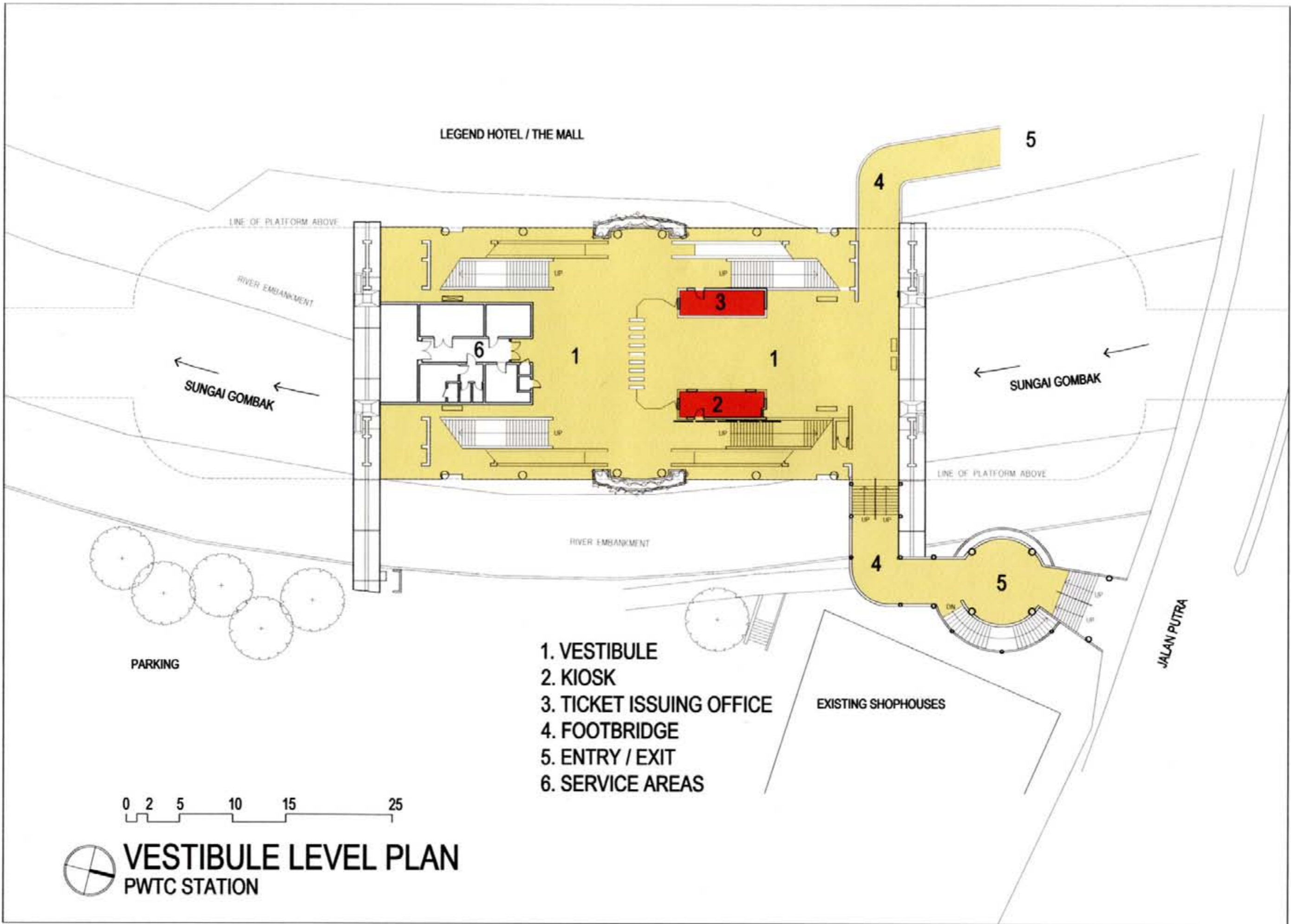
SECTION
MASJID JAMEK STATION



0 2 5 10 15 25



SITE PLAN
PWTC STATION



LEGEND HOTEL / THE MALL

LINE OF PLATFORM ABOVE

RIVER EMBANKMENT

SUNGAI GOMBAK

SUNGAI GOMBAK

LINE OF PLATFORM ABOVE

RIVER EMBANKMENT

PARKING

EXISTING SHOPHOUSES

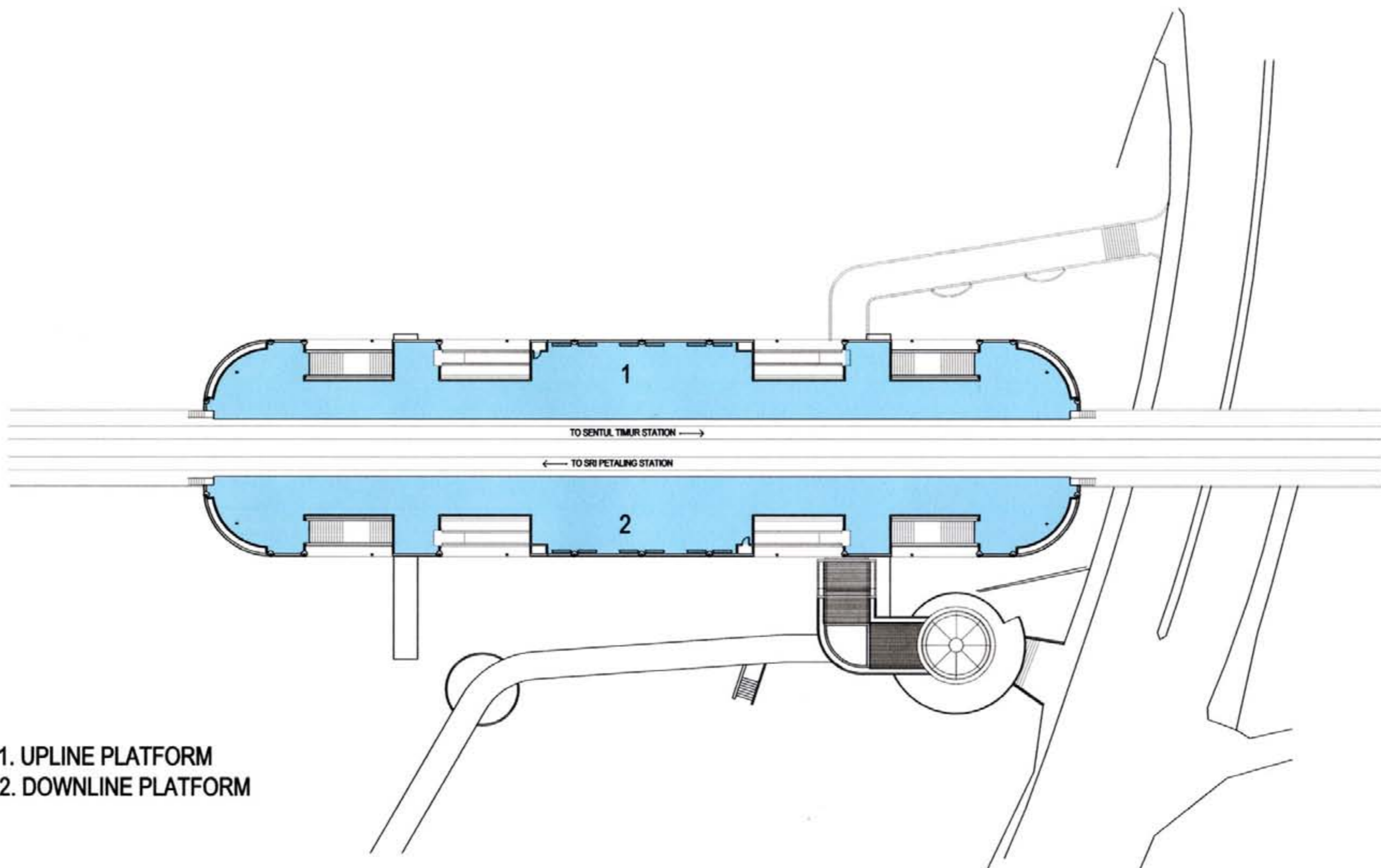
JALAN PUTRA

- 1. VESTIBULE
- 2. KIOSK
- 3. TICKET ISSUING OFFICE
- 4. FOOTBRIDGE
- 5. ENTRY / EXIT
- 6. SERVICE AREAS

0 2 5 10 15 25



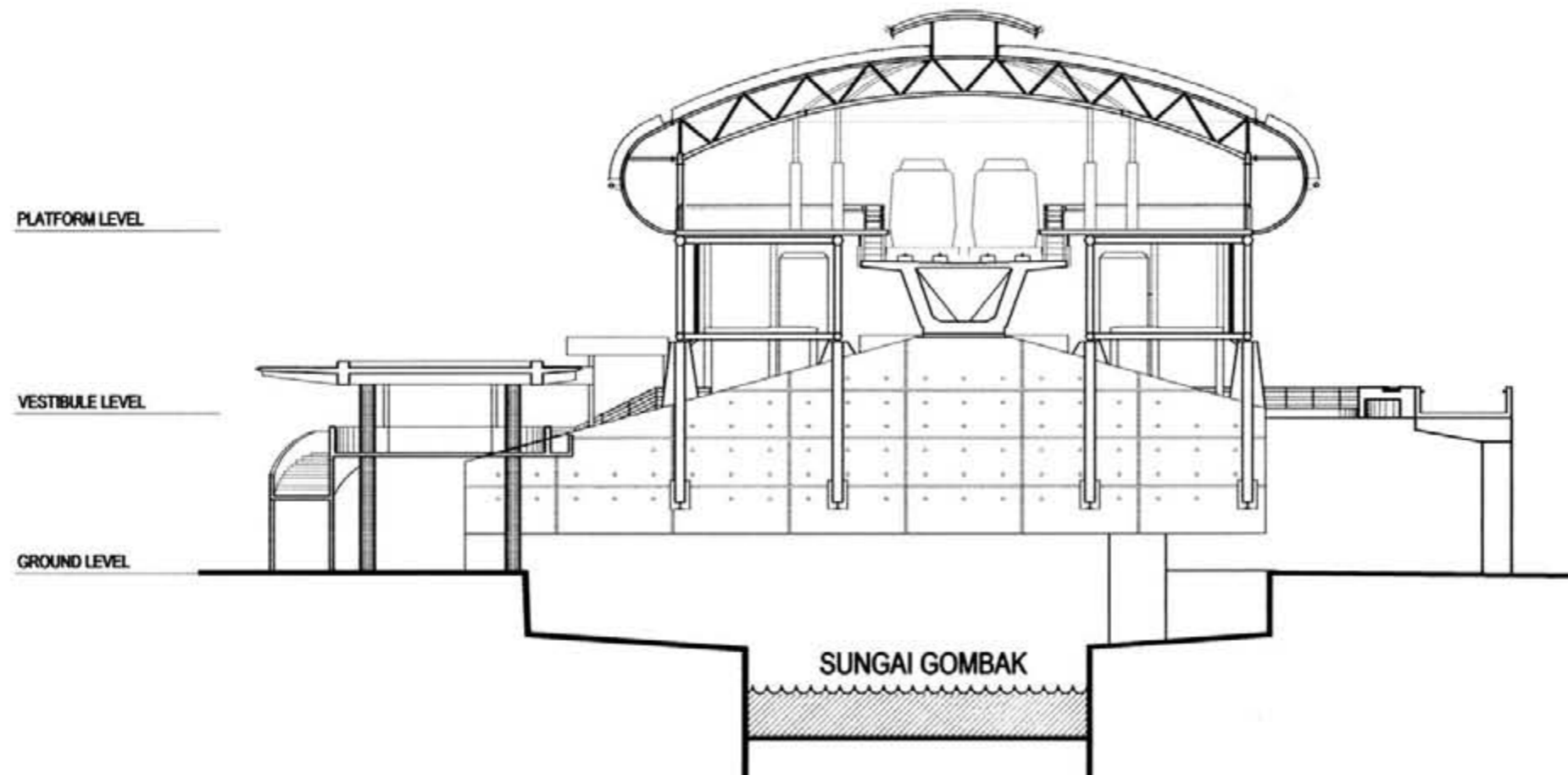
VESTIBULE LEVEL PLAN
PWTC STATION



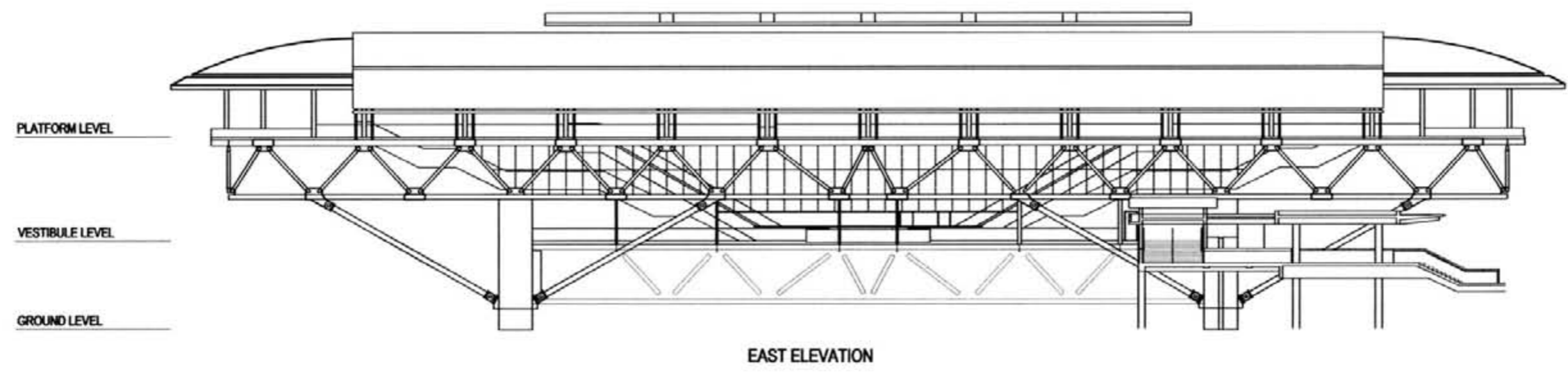
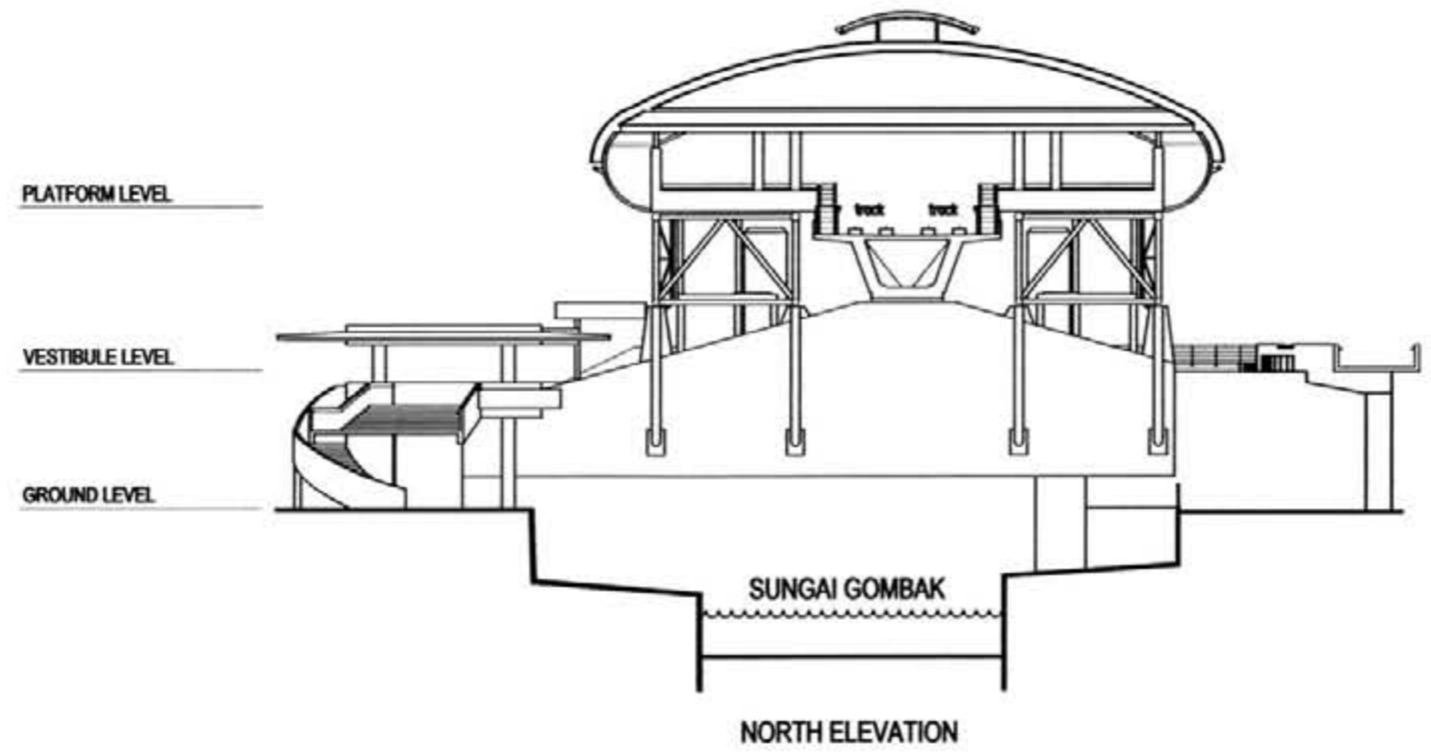
- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM



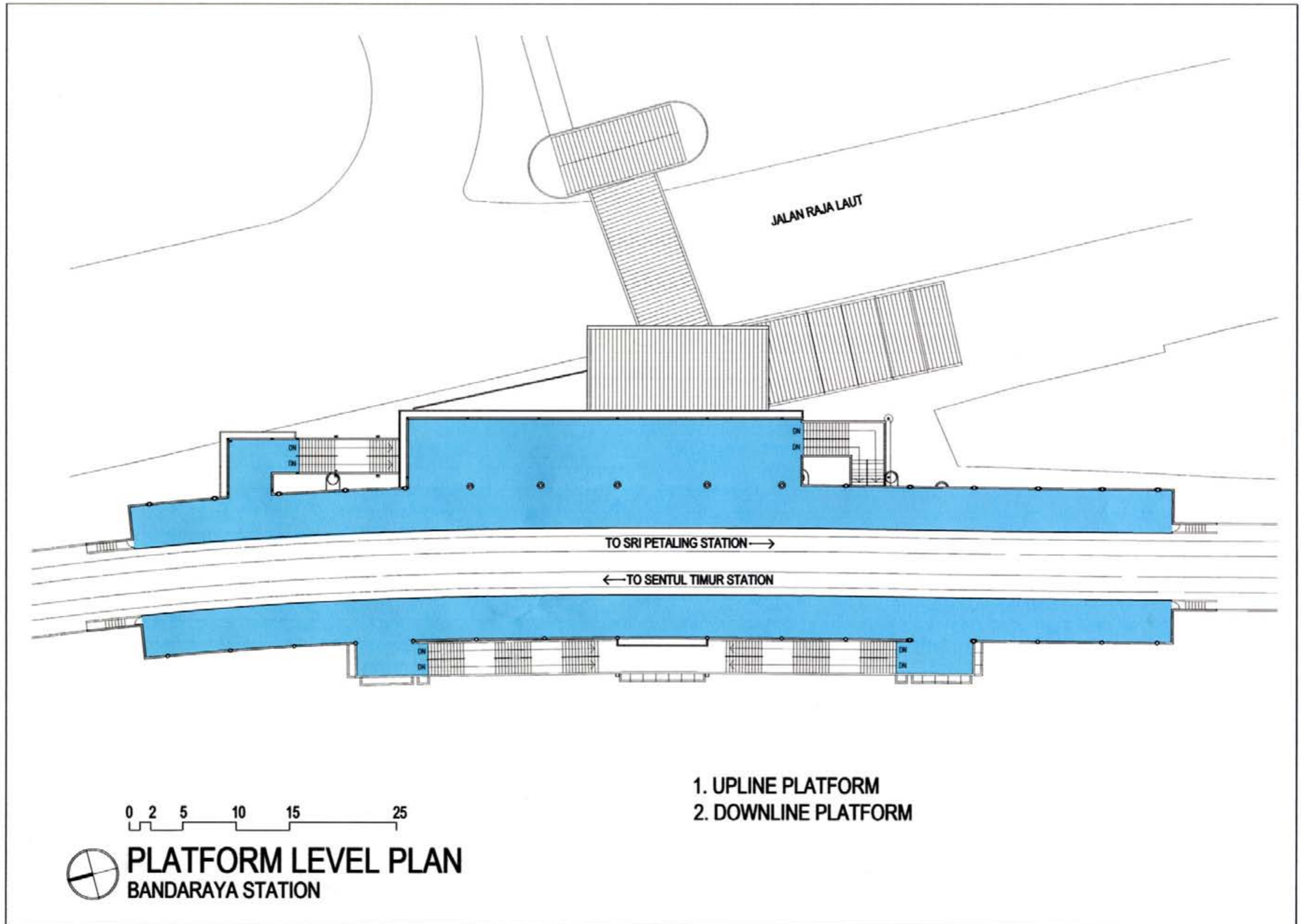
PLATFORM LEVEL PLAN
PWTC STATION



CROSS SECTION
PWTC STATION



ELEVATIONS
PWTC STATION



JALAN RAJA LAUT

TO SRI PETALING STATION →

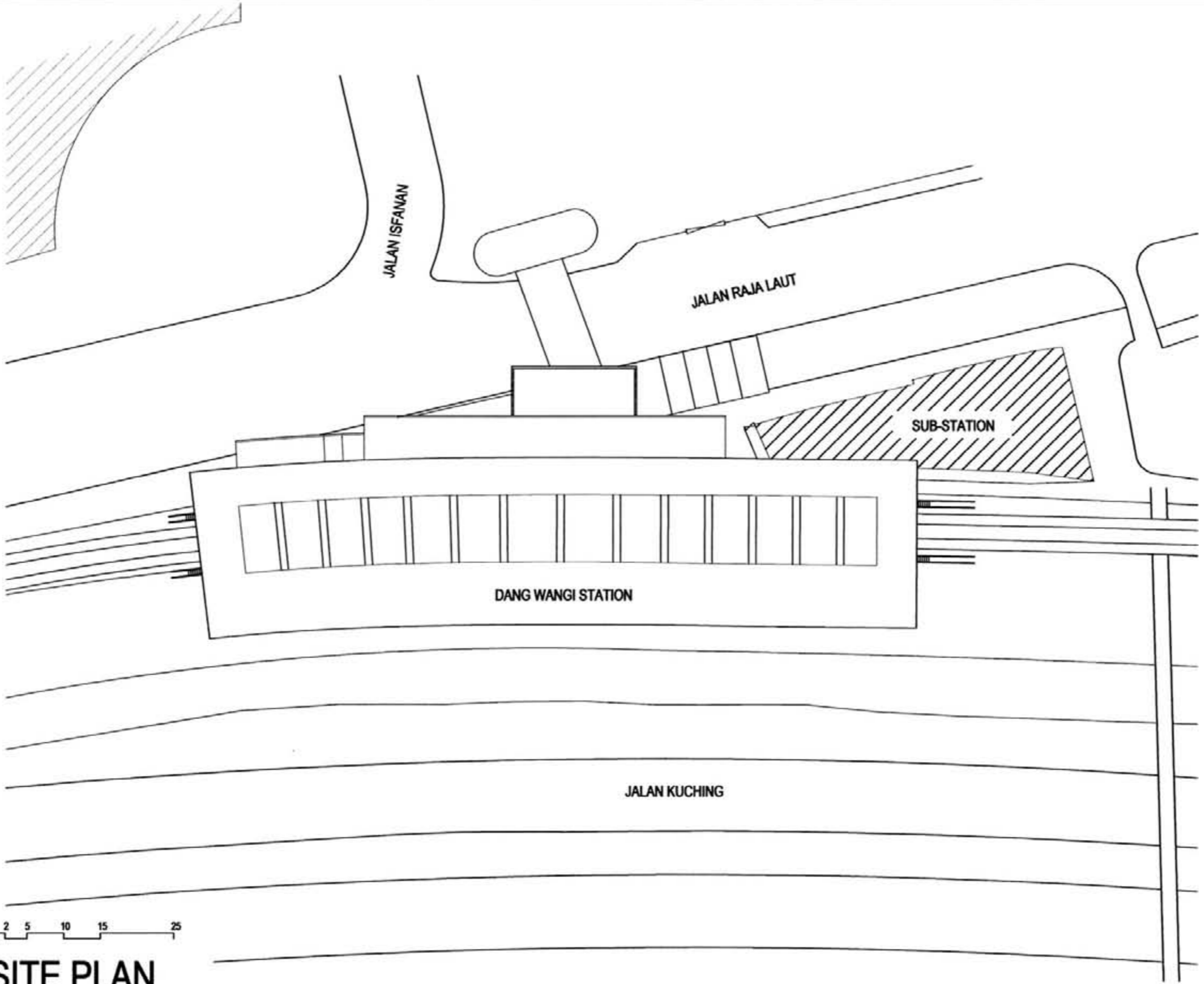
← TO SENTUL TIMUR STATION

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PLATFORM LEVEL PLAN
BANDARAYA STATION

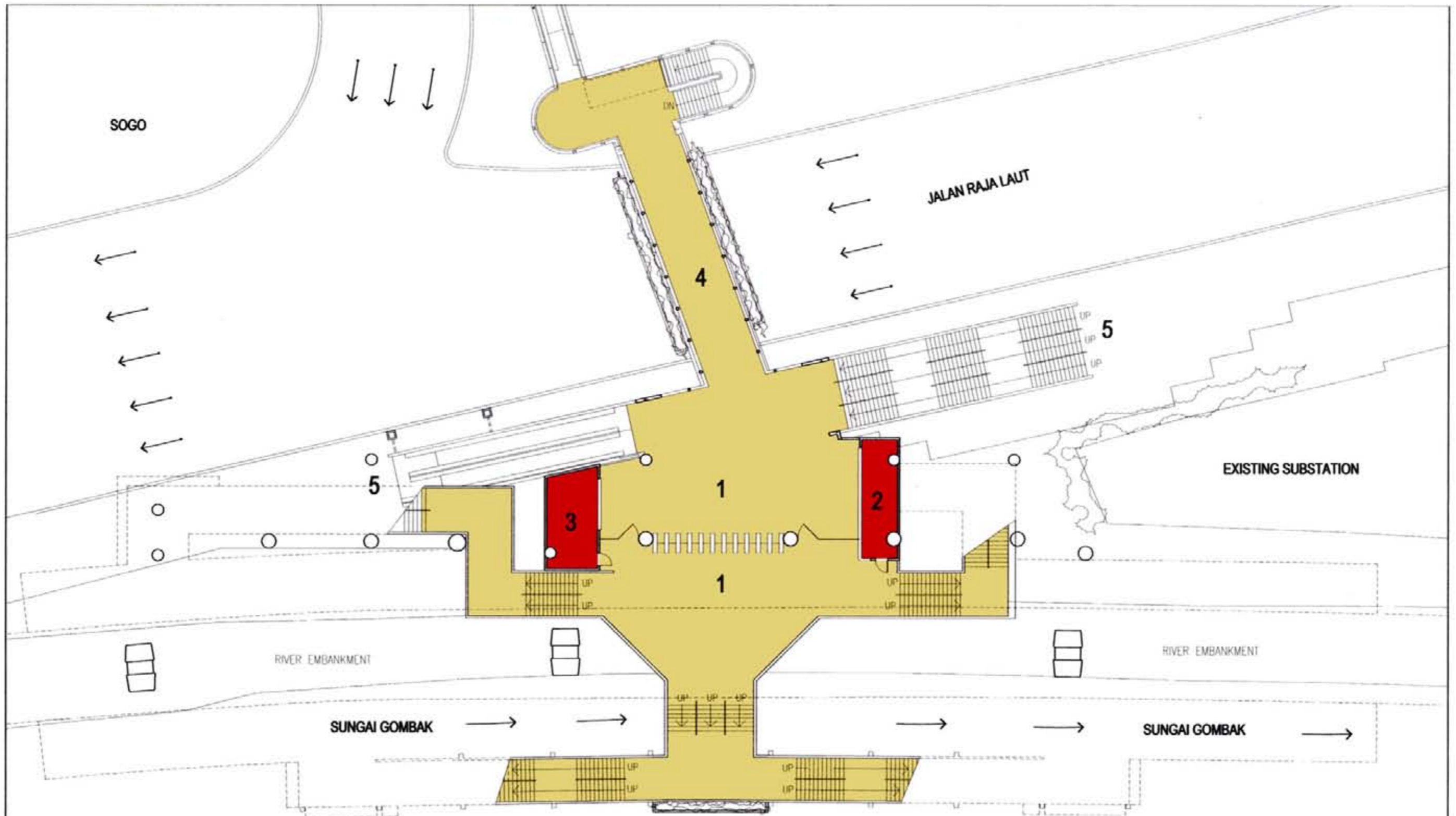
- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM



0 2 5 10 15 25



SITE PLAN
BANDARAYA STATION



SOGO

JALAN RAJA LAUT

EXISTING SUBSTATION

RIVER EMBANKMENT

RIVER EMBANKMENT

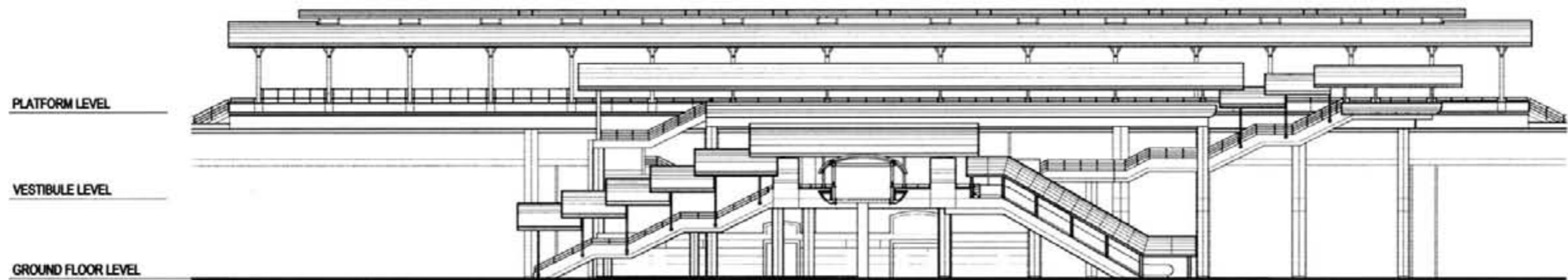
SUNGAI GOMBAK

SUNGAI GOMBAK

0 2 5 10 15 25

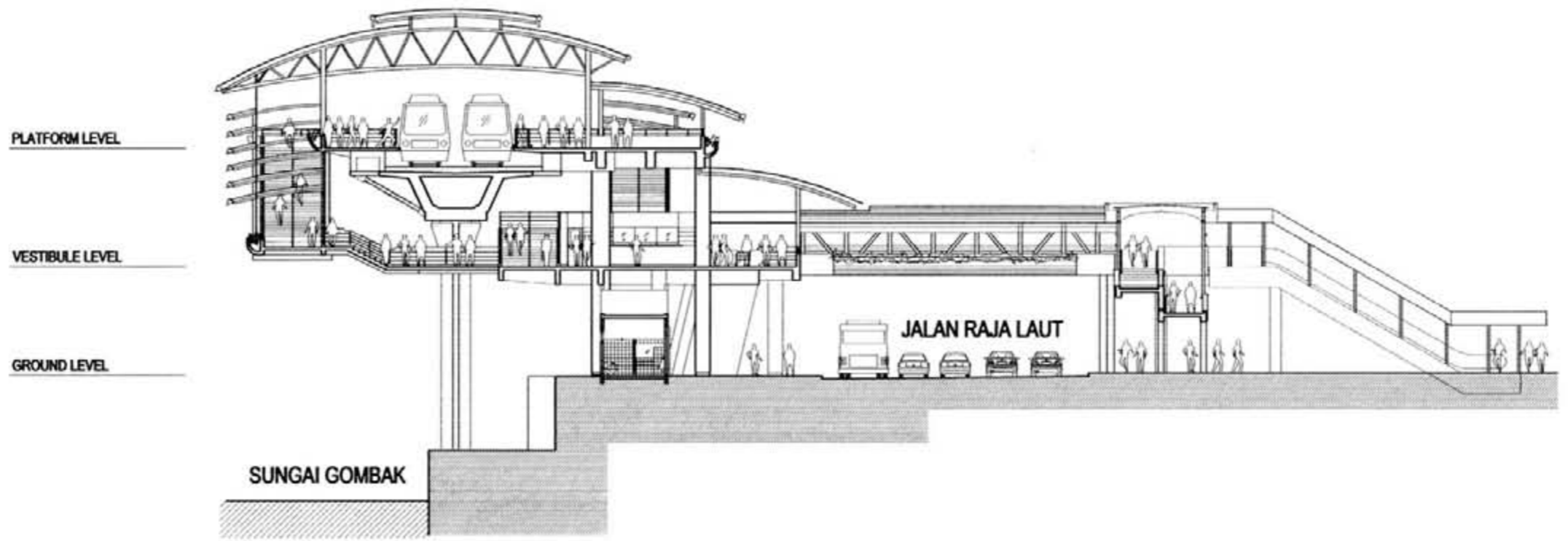
 **VESTIBULE LEVEL PLAN**
BANDARAYA STATION

- 1. VESTIBULE
- 2. TICKET ISSUING OFFICE
- 3. KIOSK
- 4. OVERHEAD FOOTBRIDGE
- 5. ENTRY / EXIT



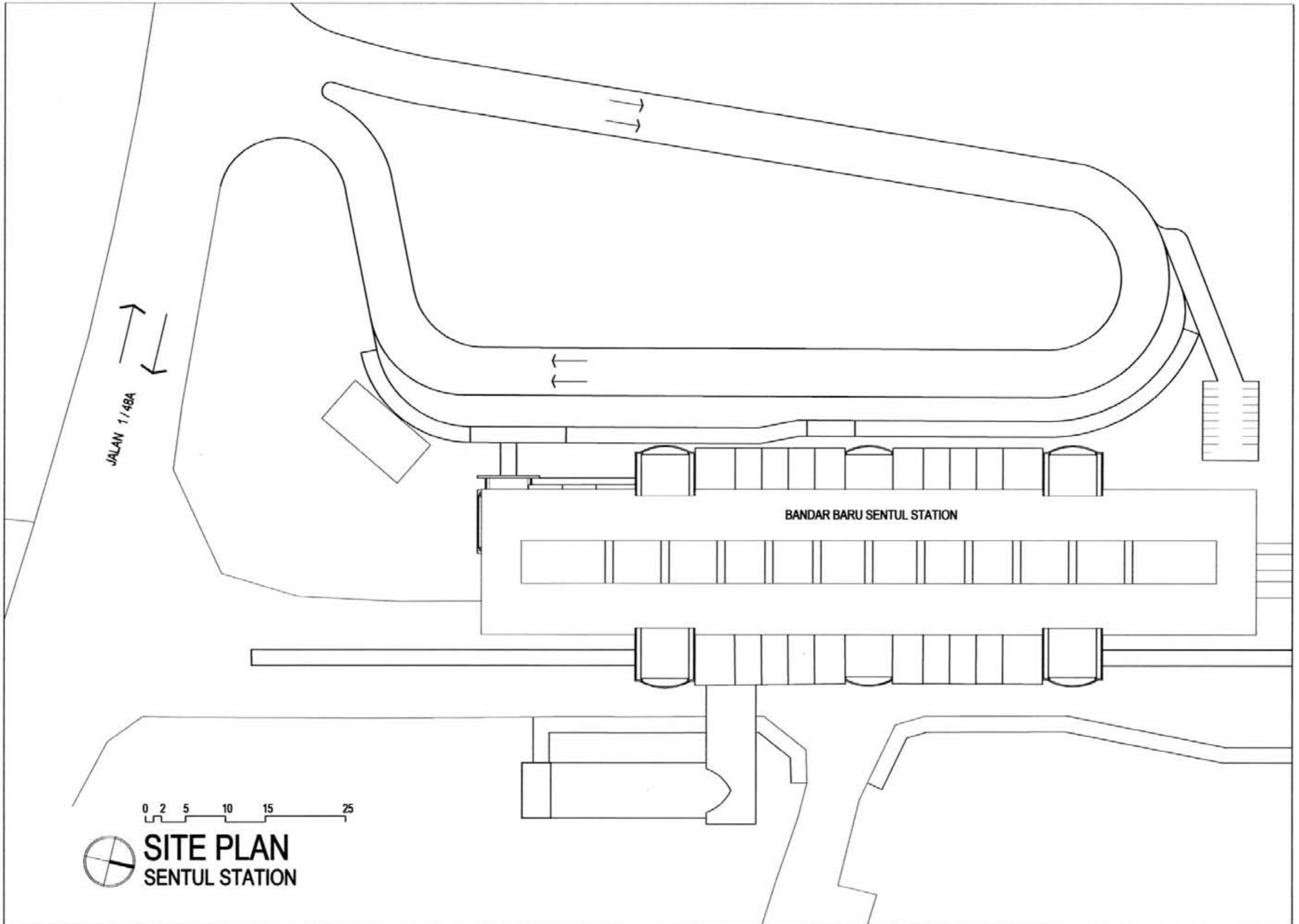
0 2 5 10 15 25

EAST ELEVATION
BANDARAYA STATION



0 2 5 10 15 25

CROSS SECTION
BANDARAYA STATION



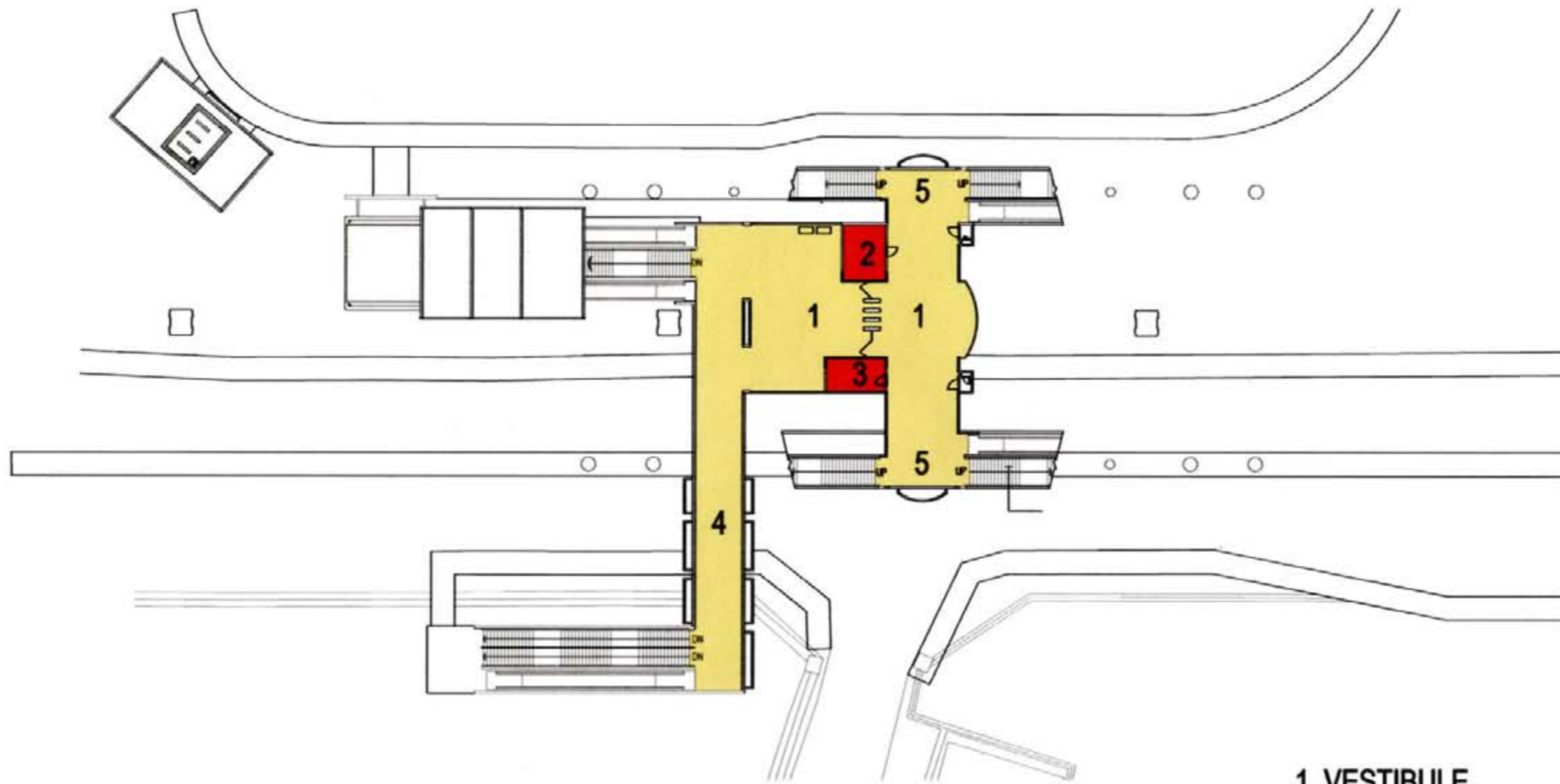
JALAN 1/4BA

BANDAR BARU SENTUL STATION

0 2 5 10 15 25




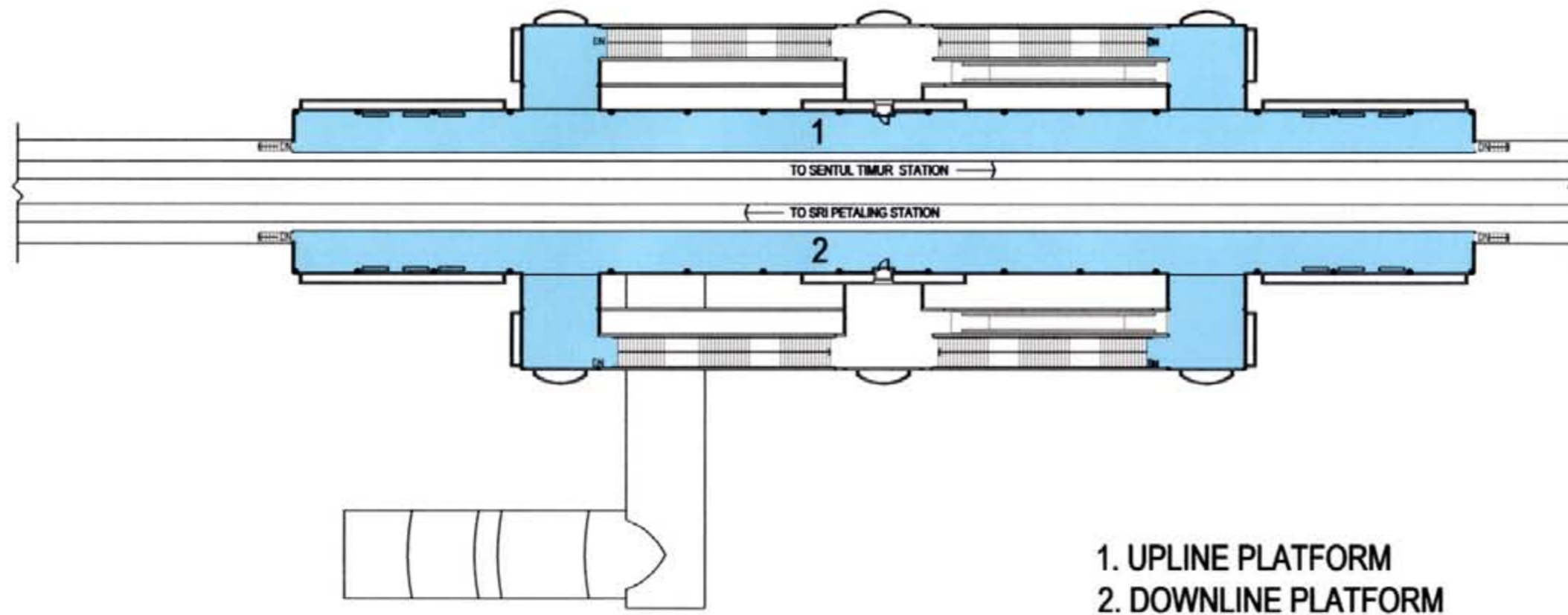
SITE PLAN
SENTUL STATION



- 1. VESTIBULE
- 2. KIOSK
- 3. TICKET ISSUING OFFICE
- 4. FOOTBRIDGE
- 5. ENTRY / EXIT
- 6. SERVICE AREAS

0 2 5 10 15 25

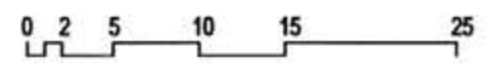
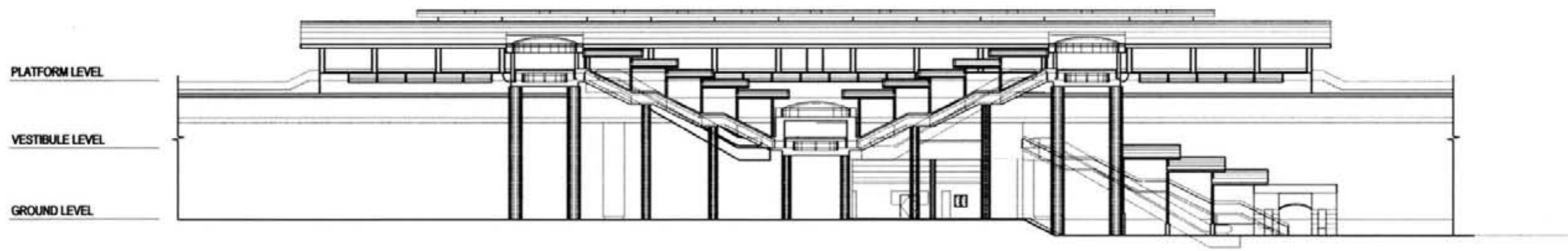
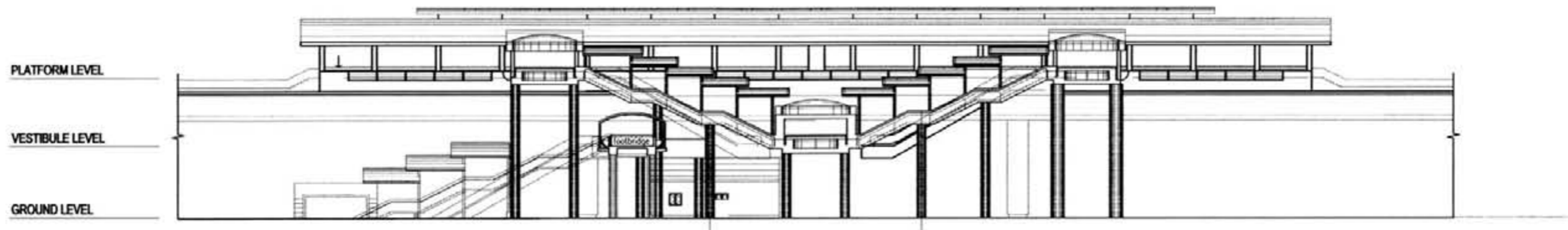
 **VESTIBULE LEVEL PLAN**
SENTUL STATION



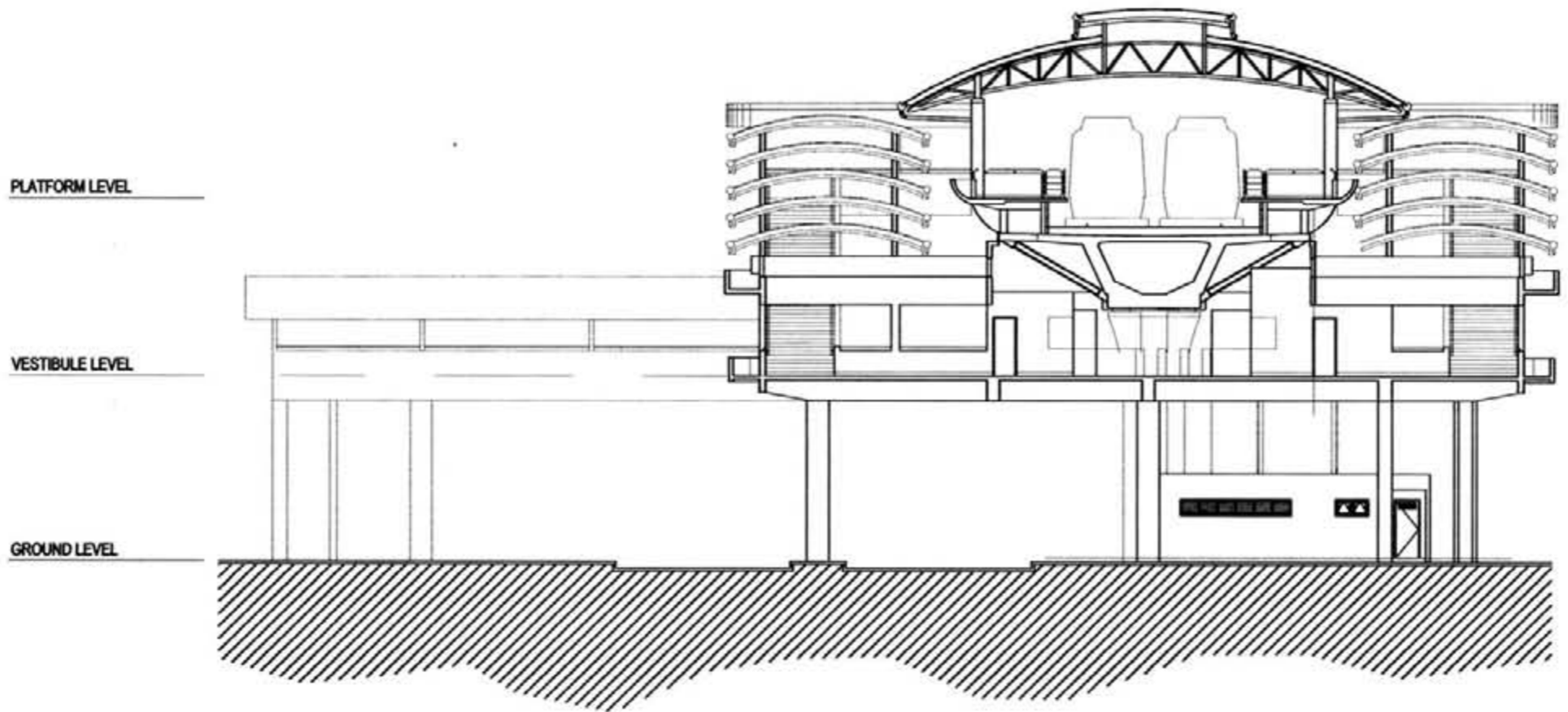
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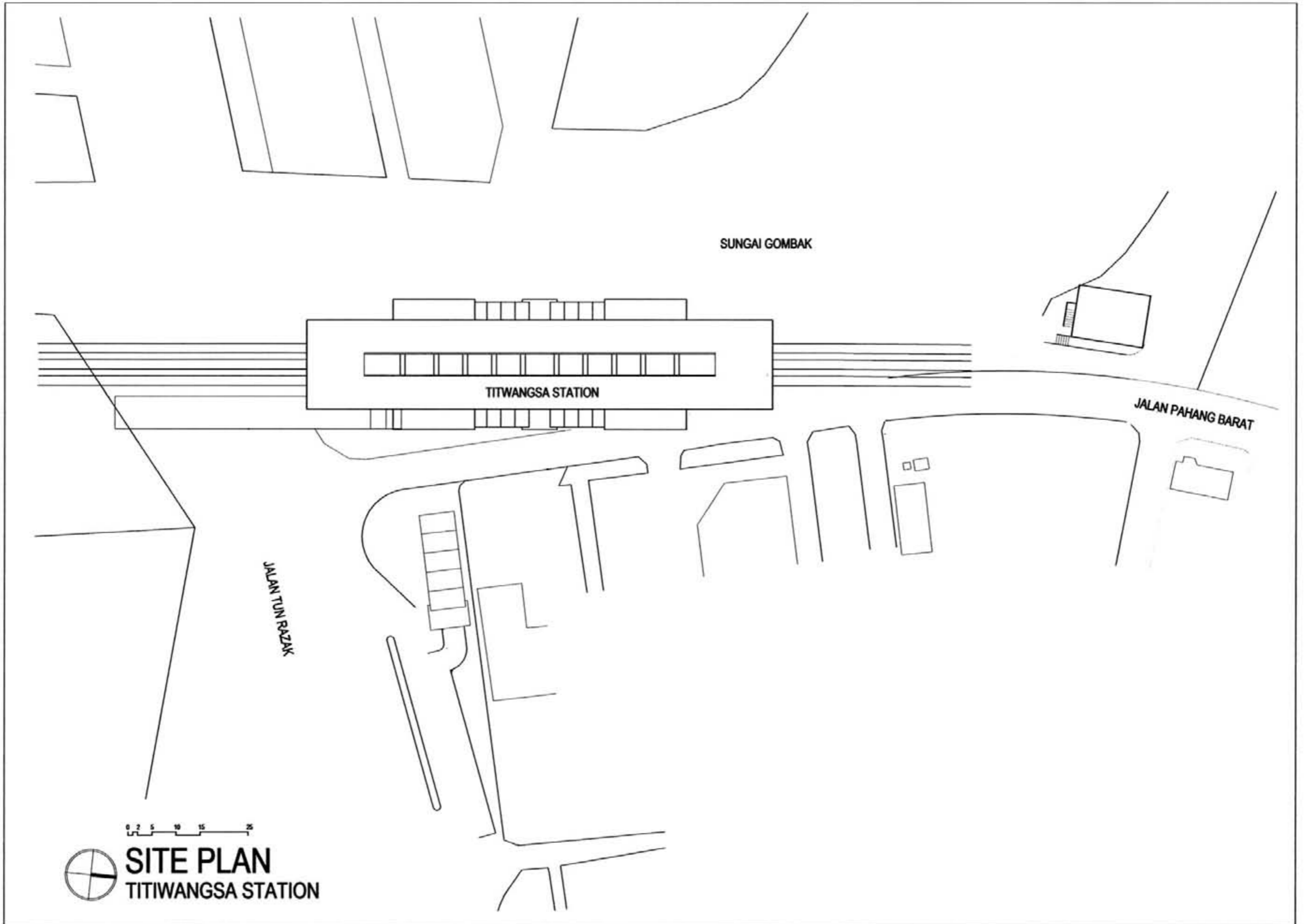
PLATFORM LEVEL PLAN
SENTUL STATION



ELEVATIONS
SENTUL STATION



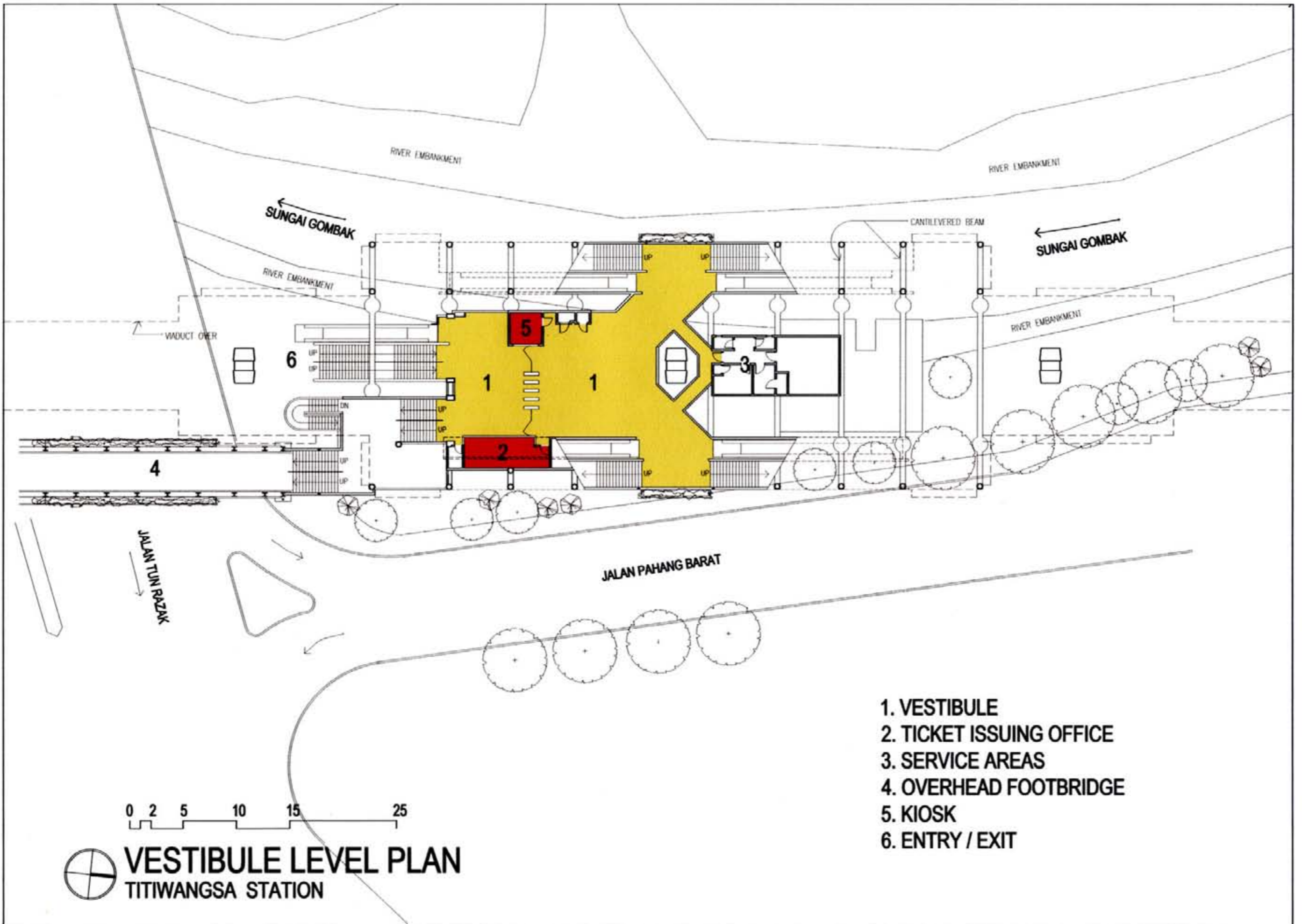
CROSS SECTION
SENTUL STATION

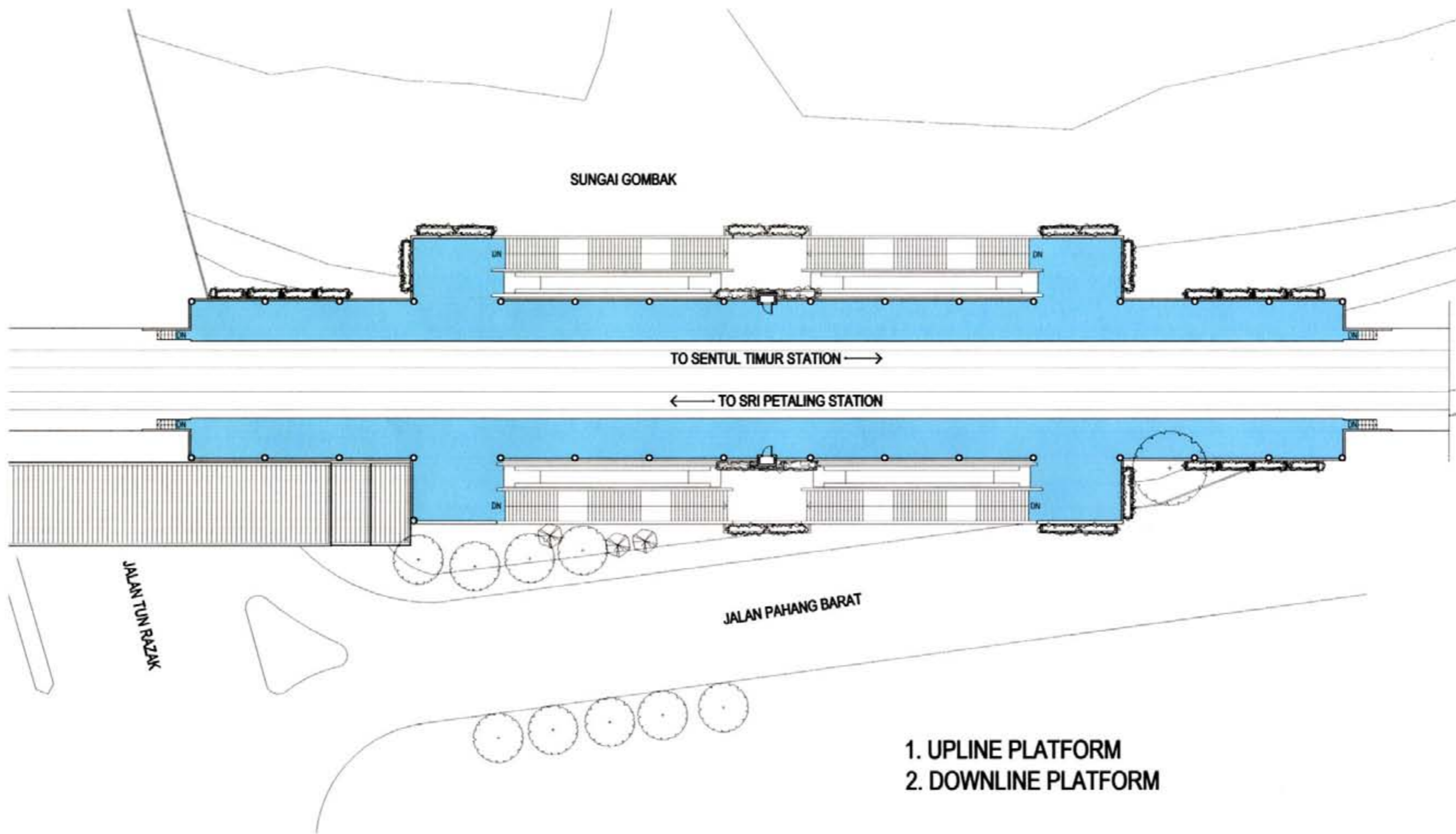


0 2 5 10 15 25



SITE PLAN
TITWANGSA STATION

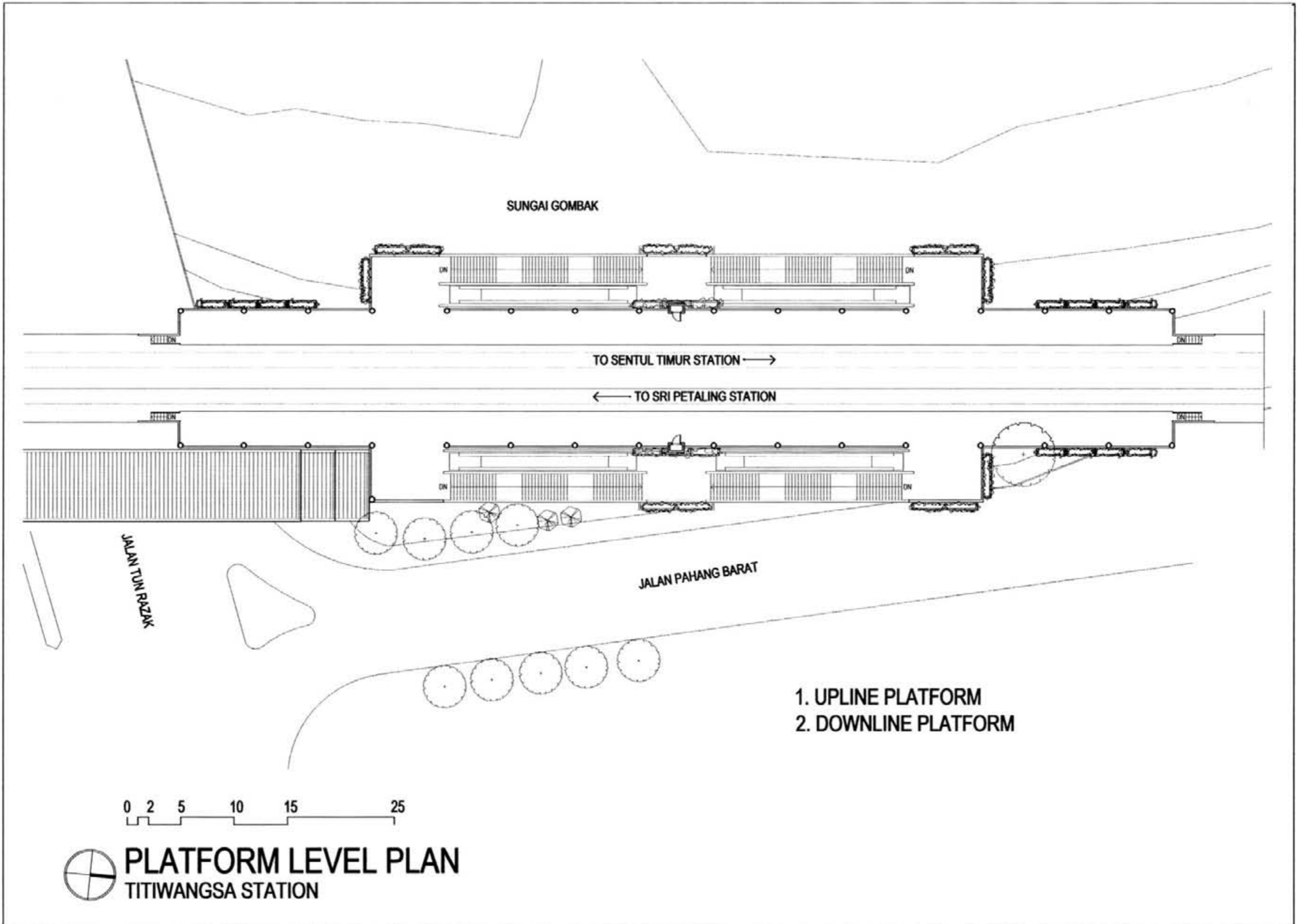




0 2 5 10 15 25

 **PLATFORM LEVEL PLAN**
TITIWANGSA STATION

- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM



SUNGAI GOMBAK

TO SENTUL TIMUR STATION →

← TO SRI PETALING STATION

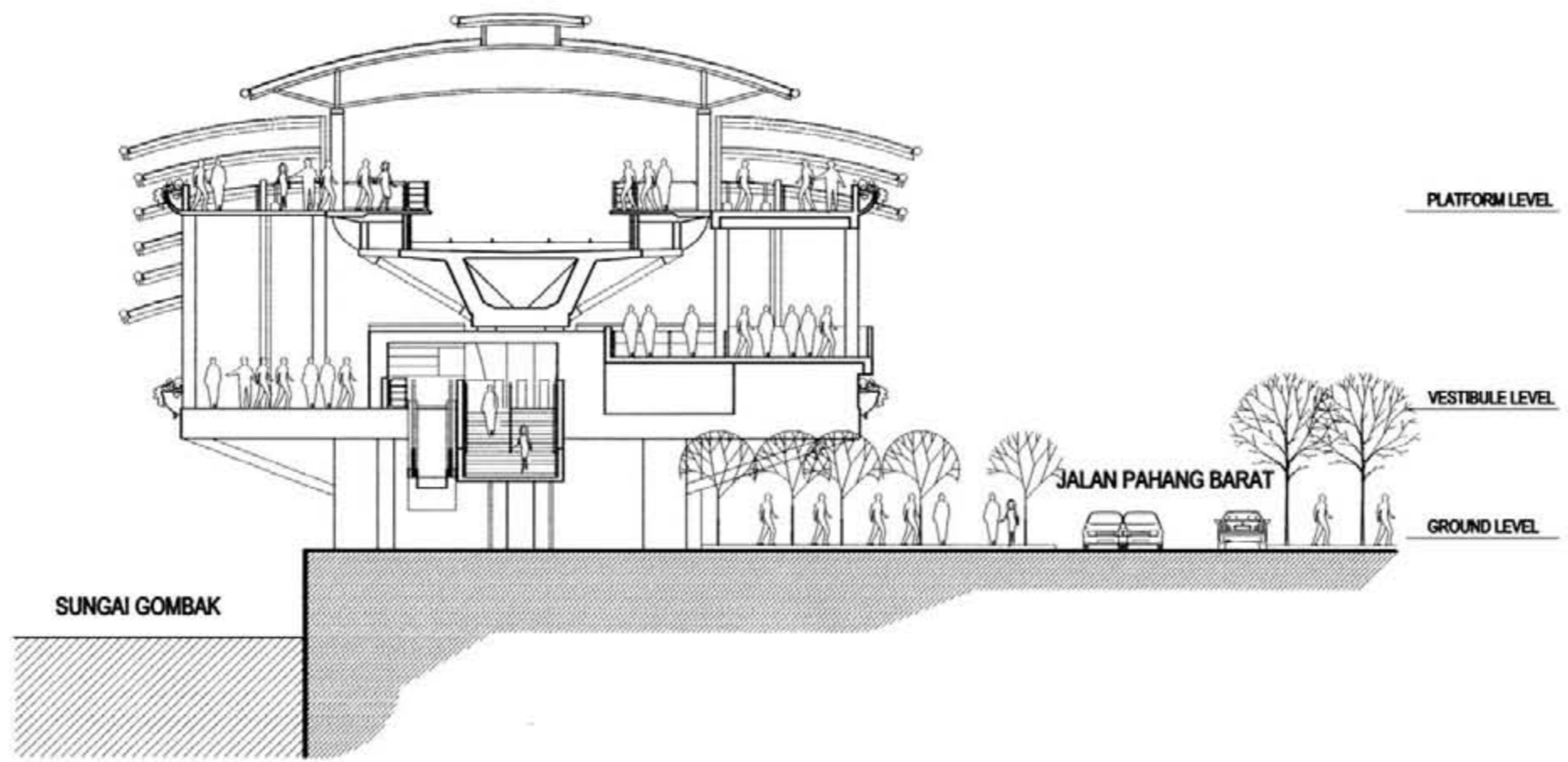
JALAN TUN RAZAK

JALAN PAHANG BARAT

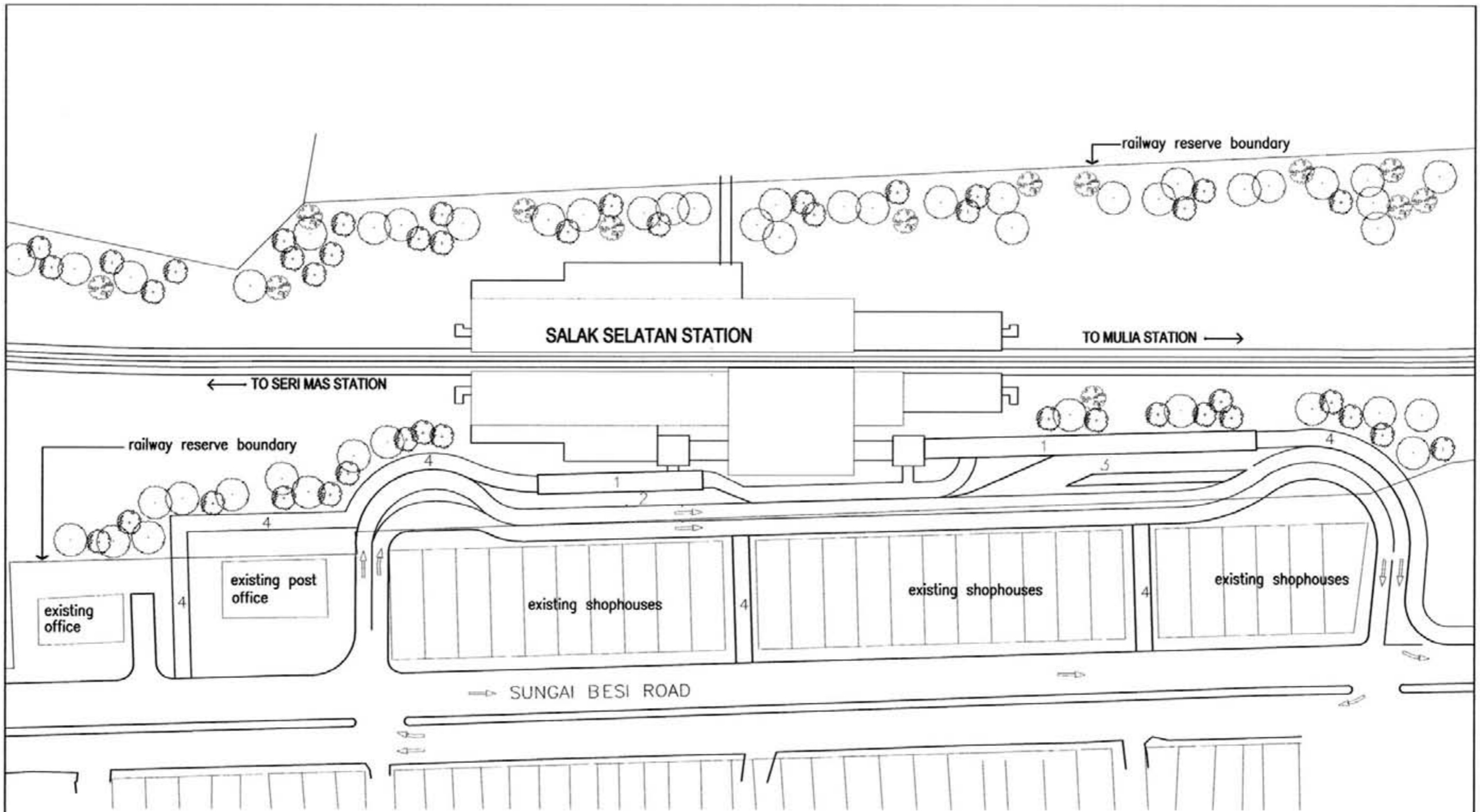
- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM

0 2 5 10 15 25

 **PLATFORM LEVEL PLAN**
TITIWANGSA STATION



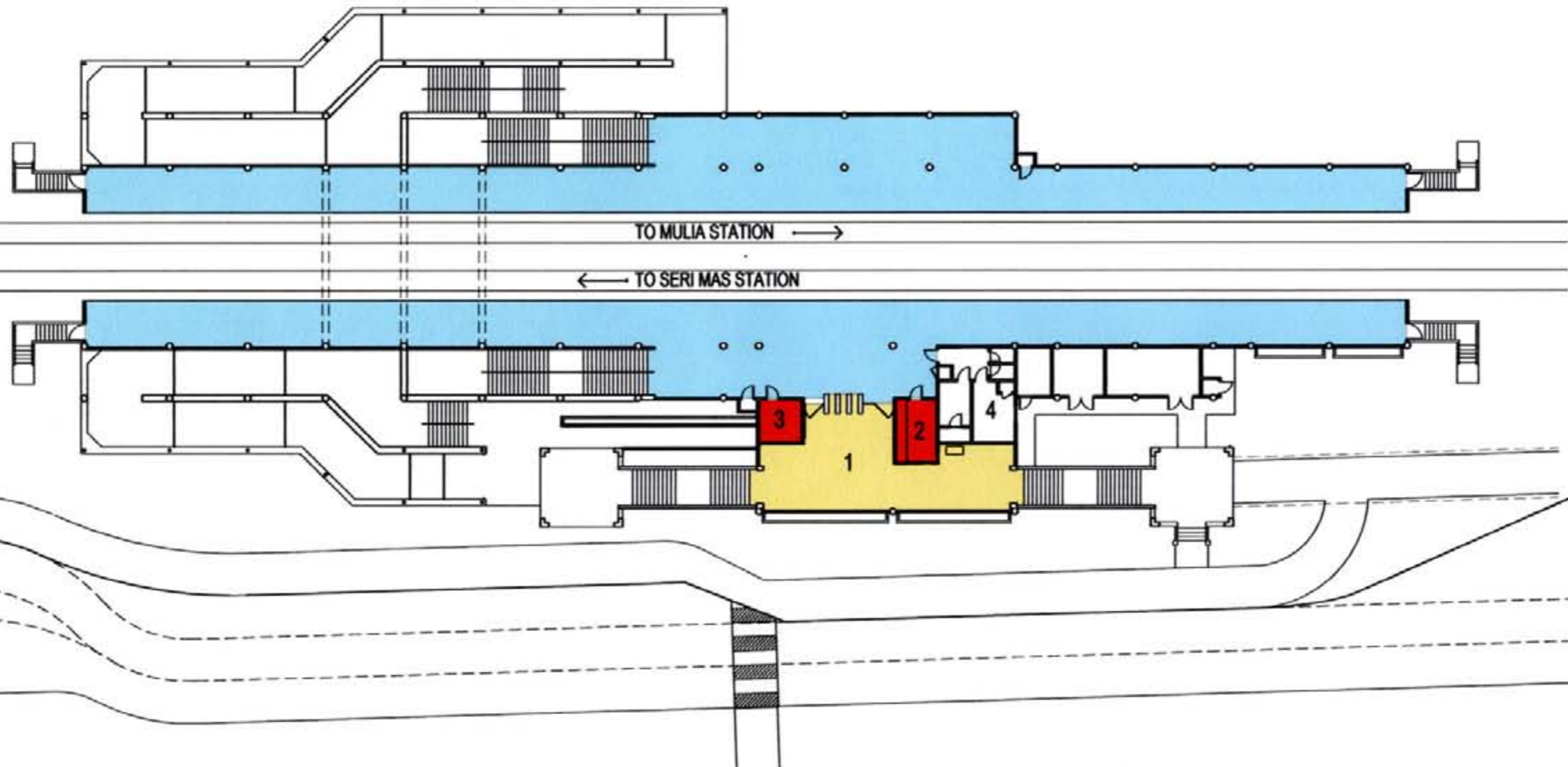
CROSS SECTION
TITIWANGSA STATION



SITE PLAN
SALAK SELATAN STATION

- 1 covered walkway
- 2 taxi layby
- 3 bus layby
- 4 footpath

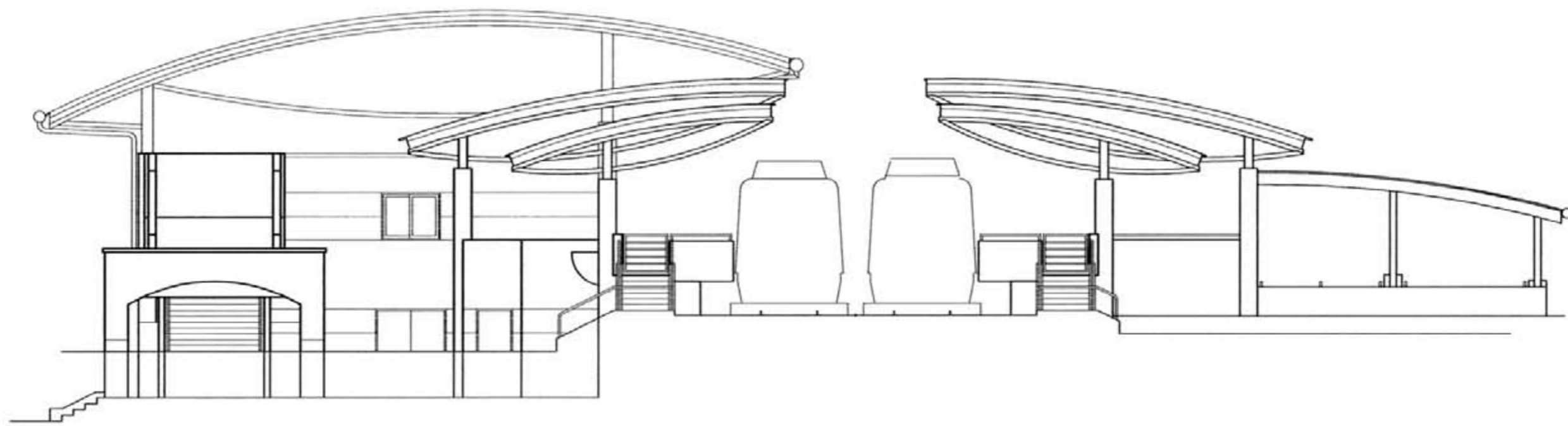
- 1. VESTIBULE PLATFORM
- 2. TICKET ISSUING OFFICE
- 3. KIOSK
- 4. SERVICE AREAS



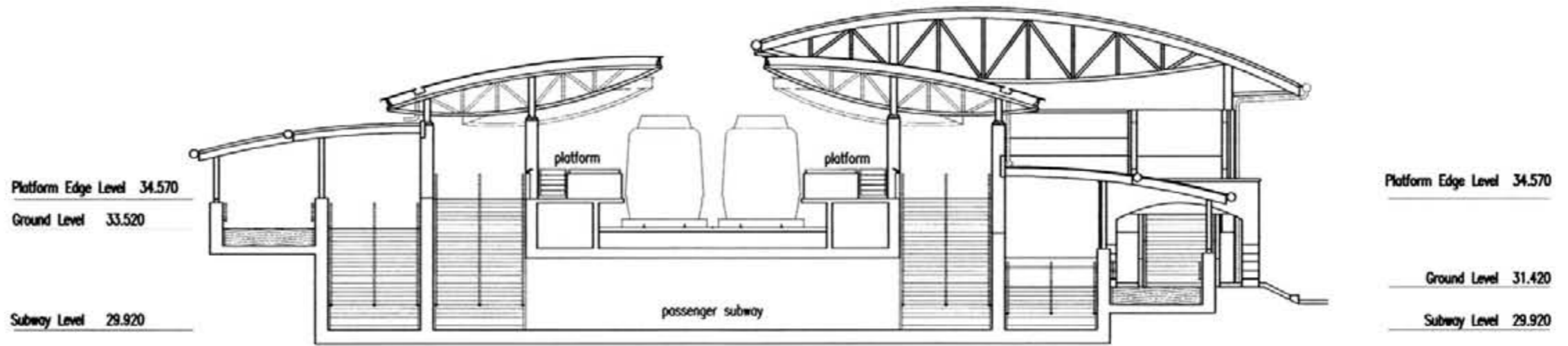
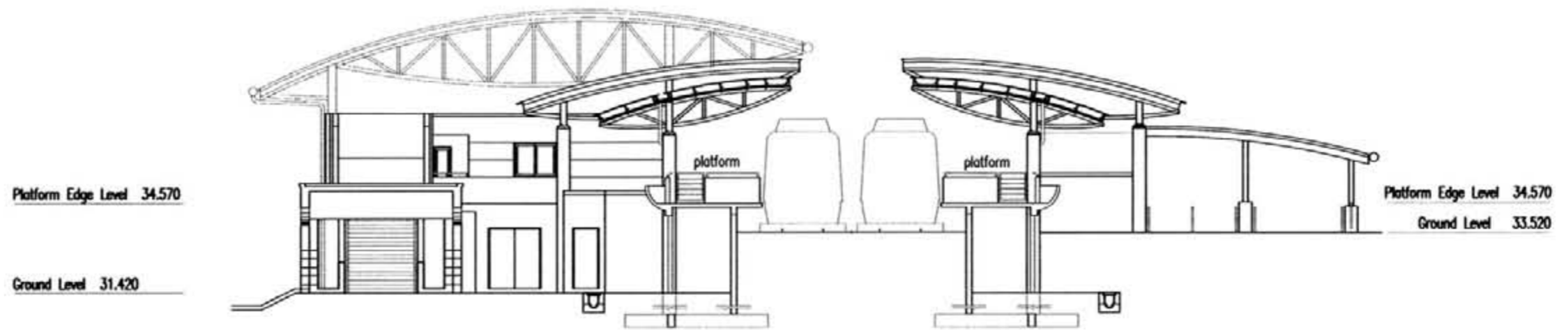
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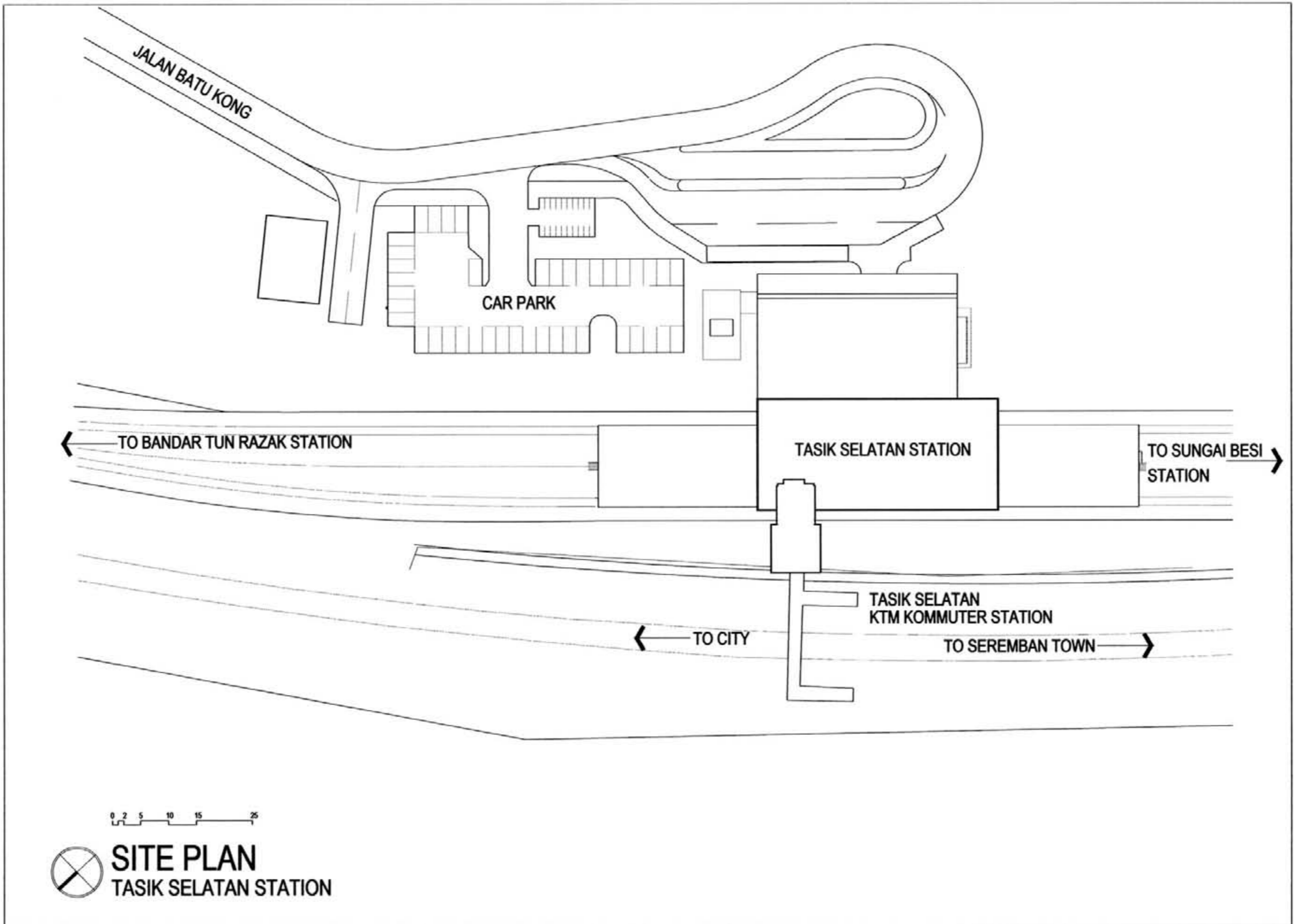
VESTIBULE / PLATFORM LEVEL PLAN
SALAK SELATAN STATION



ELEVATION
SALAK SELATAN STATION



SECTION
SALAK SELATAN STATION

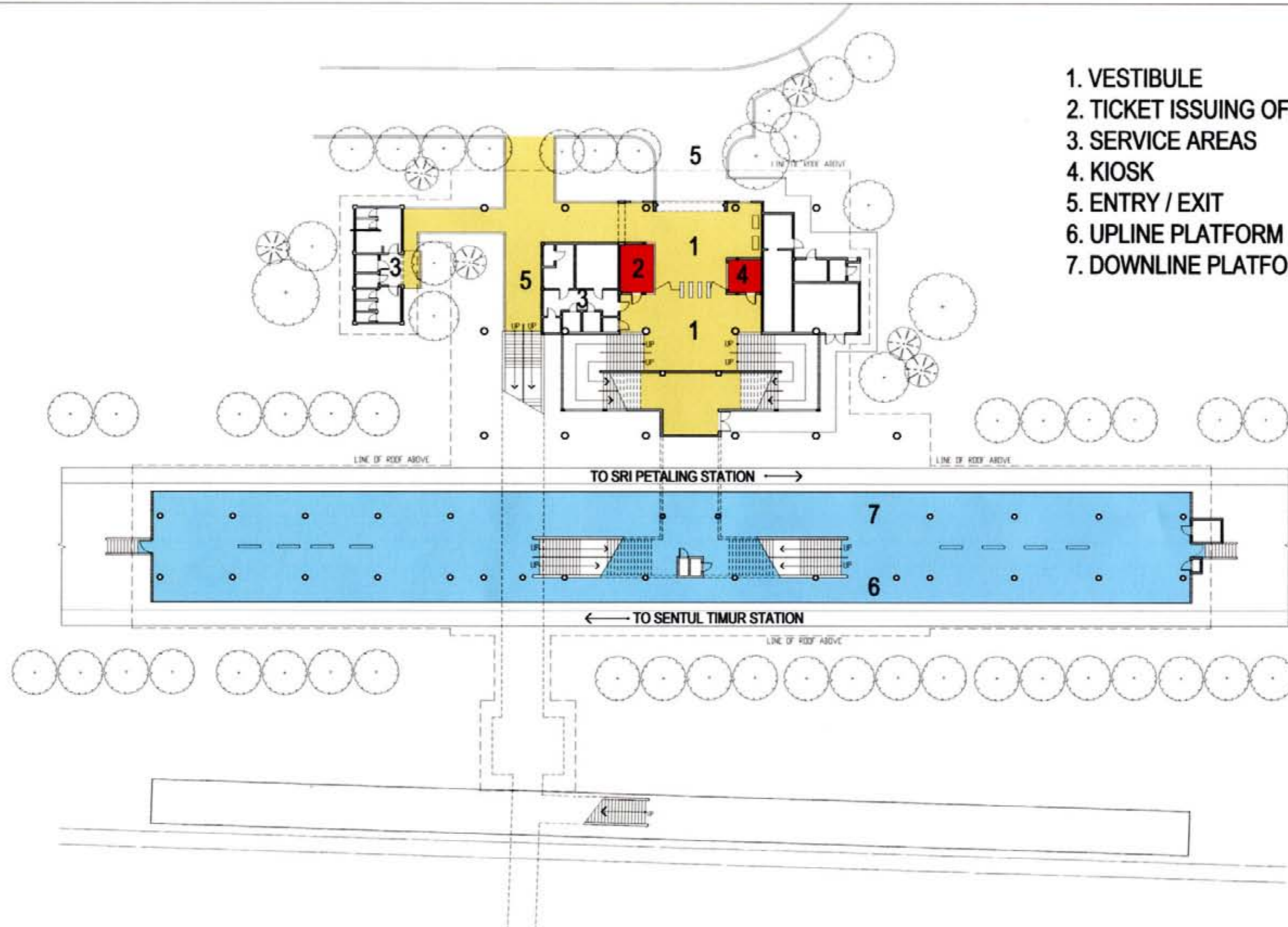


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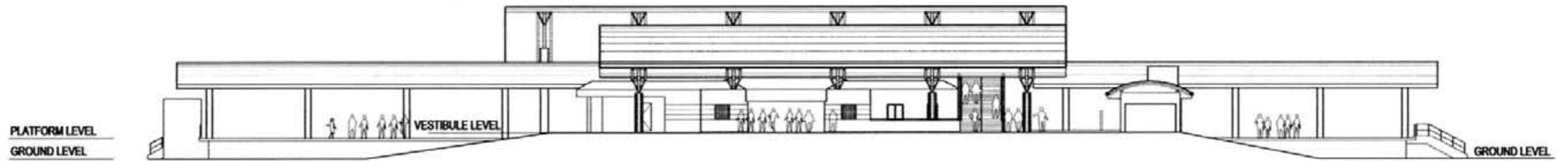


SITE PLAN
TASIK SELATAN STATION

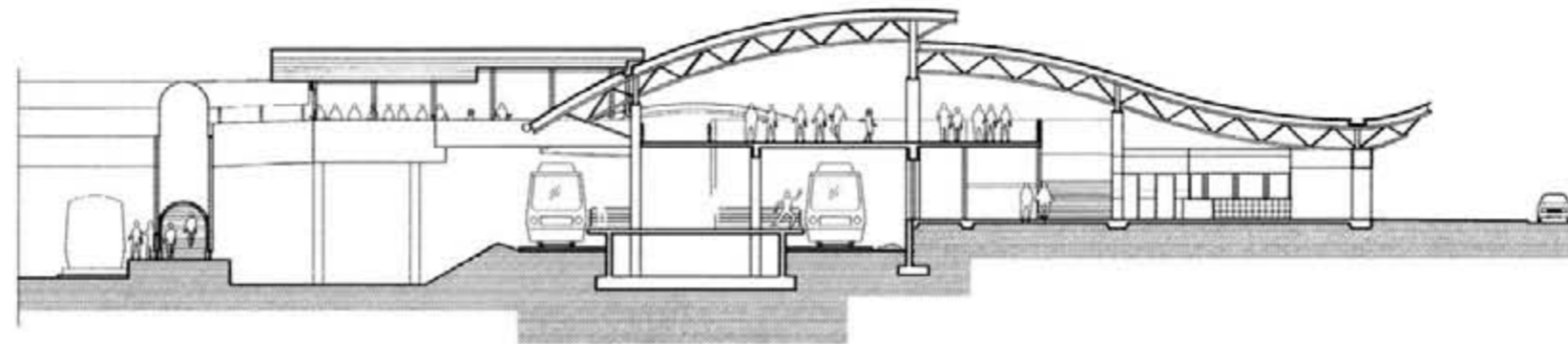
- 1. VESTIBULE
- 2. TICKET ISSUING OFFICE
- 3. SERVICE AREAS
- 4. KIOSK
- 5. ENTRY / EXIT
- 6. UPLINE PLATFORM
- 7. DOWNLINE PLATFORM



VESTIBULE AND PLATFORM LEVEL PLAN
TASIK SELATAN STATION



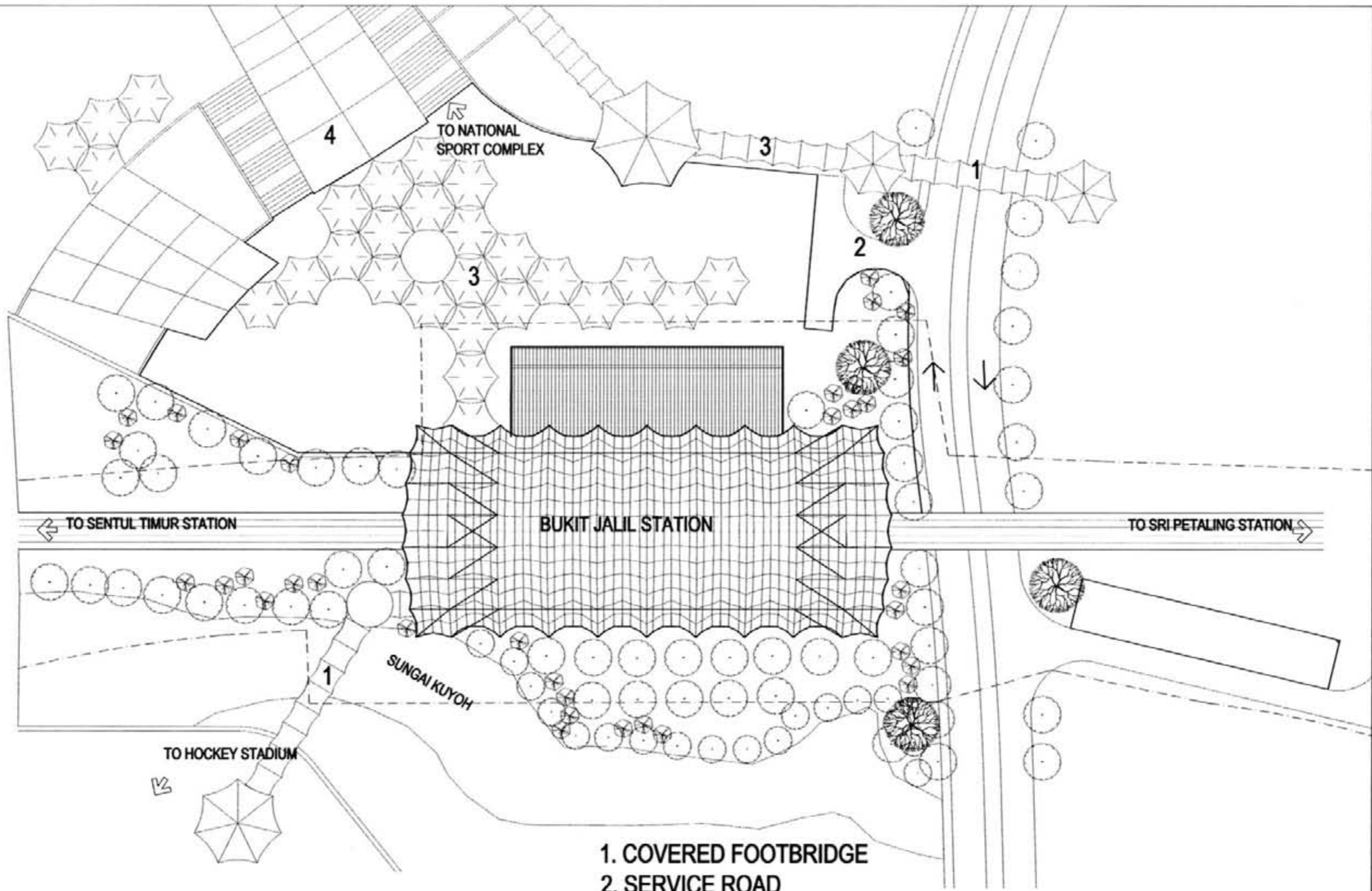
ELEVATION



SECTION

0 2 5 10 15 25

ELEVATION & SECTION
TASIK SELATAN STATION



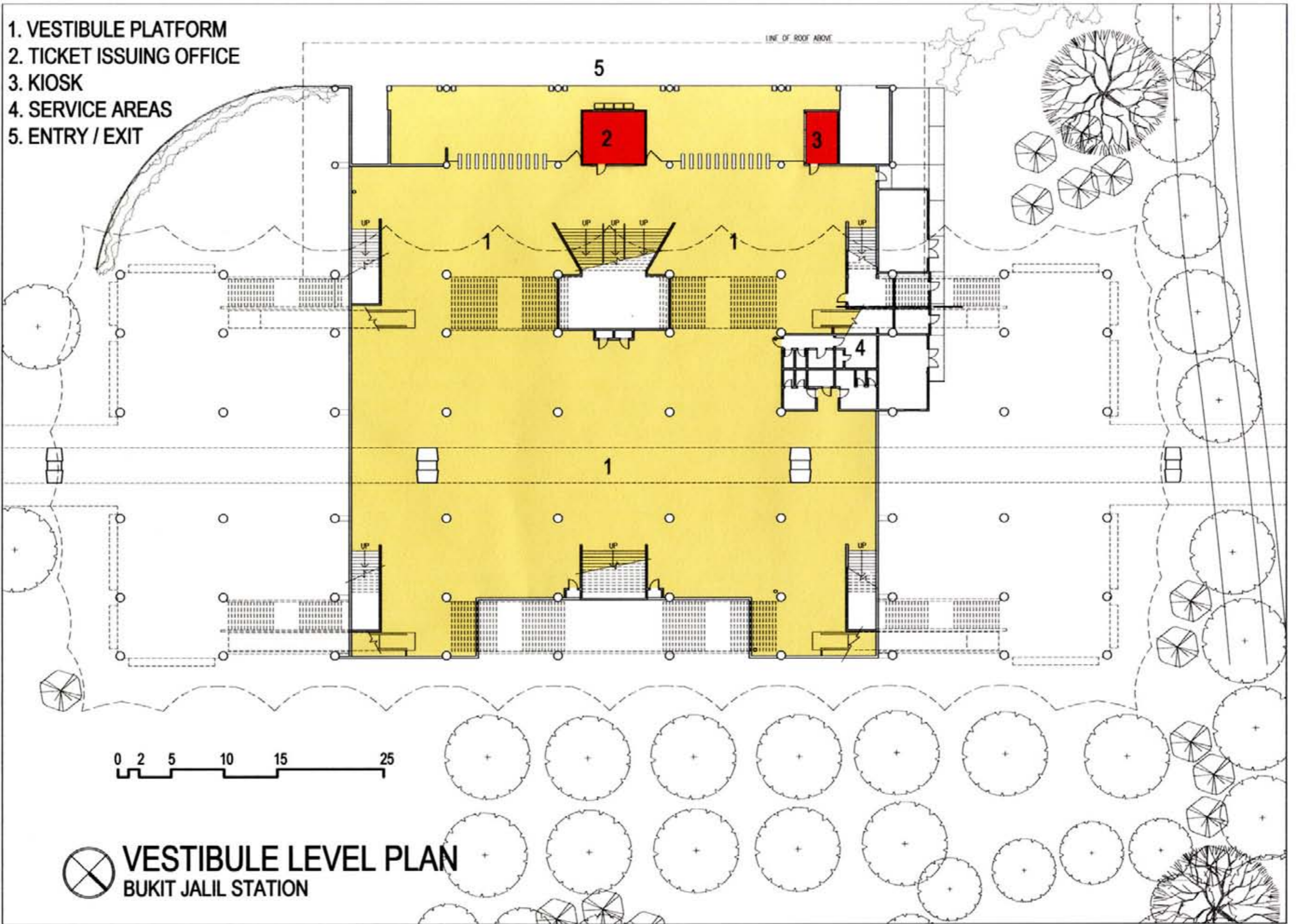
- 1. COVERED FOOTBRIDGE
- 2. SERVICE ROAD
- 3. FABRIC ROOF STRUCTURES
- 4. RAMP AND STAIRS TO NATIONAL SPORTS COMPLEX

0 2 5 10 15 20 30 40 50



SITE PLAN
BUKIT JALIL STATION

- 1. VESTIBULE PLATFORM
- 2. TICKET ISSUING OFFICE
- 3. KIOSK
- 4. SERVICE AREAS
- 5. ENTRY / EXIT



0 2 5 10 15 25

 **VESTIBULE LEVEL PLAN**
BUKIT JALIL STATION

- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM

CURVED ROOF

1

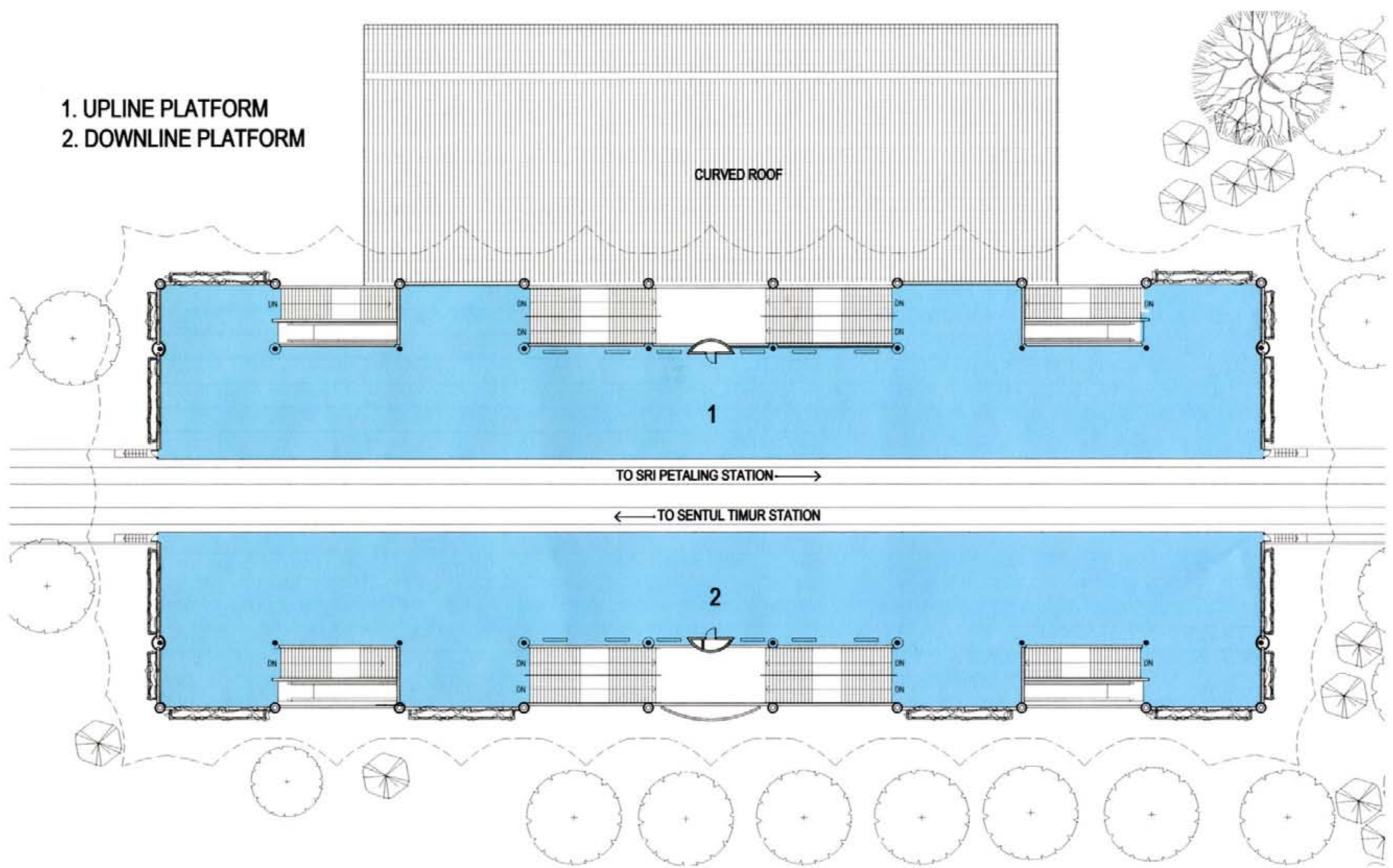
TO SRI PETALING STATION →

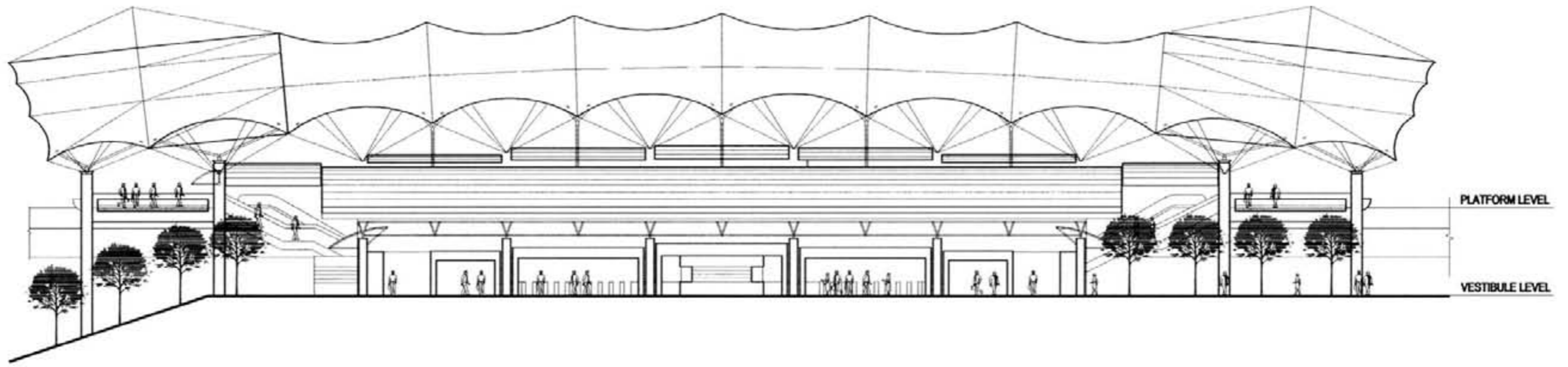
← TO SENTUL TIMUR STATION

2

0 2 5 10 15 25

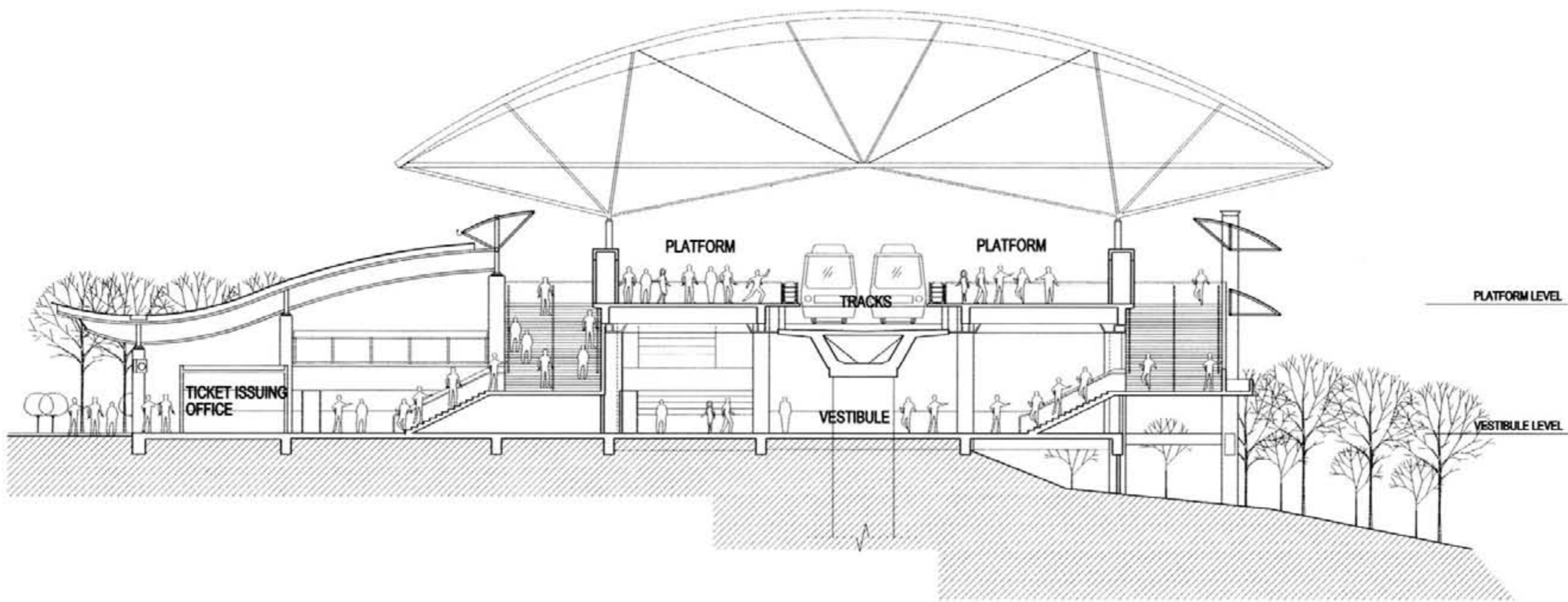
 **PLATFORM LEVEL PLAN**
BUKIT JALIL STATION





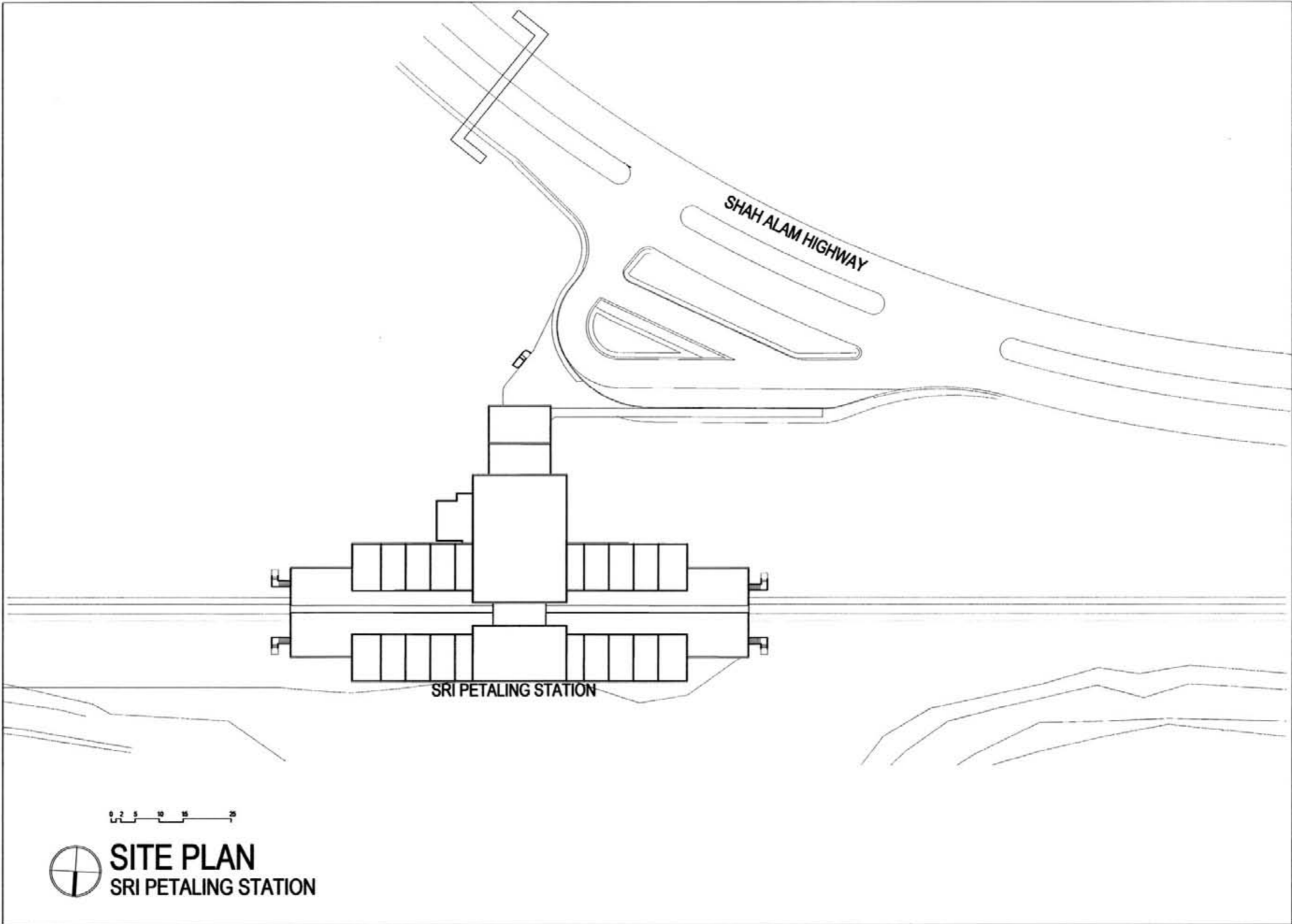
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FRONT ELEVATION
BUKIT JALIL STATION



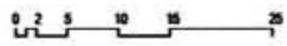
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CROSS SECTION
BUKIT JALIL STATION



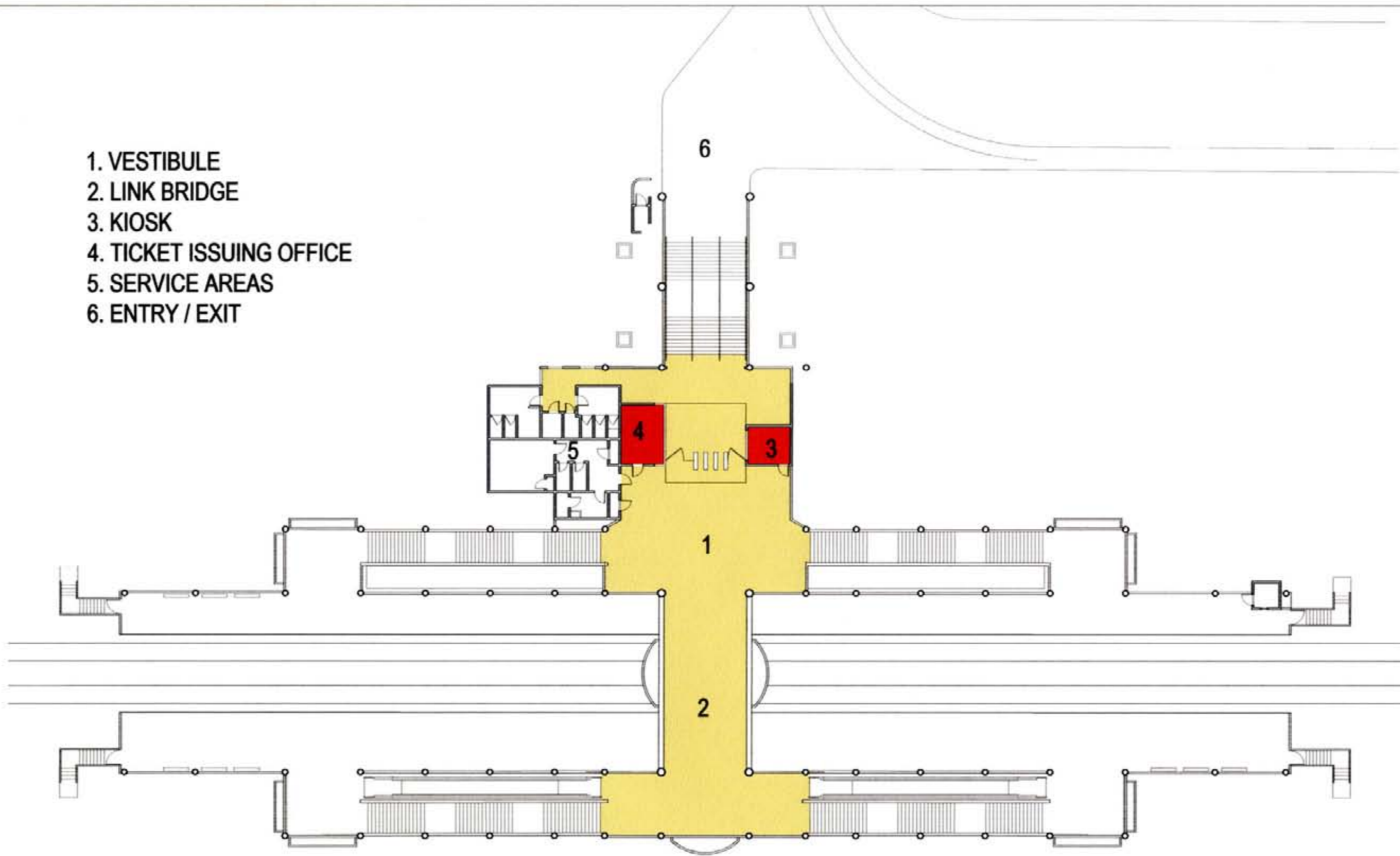
SHAH ALAM HIGHWAY

SRI PETALING STATION



SITE PLAN
SRI PETALING STATION

- 1. VESTIBULE
- 2. LINK BRIDGE
- 3. KIOSK
- 4. TICKET ISSUING OFFICE
- 5. SERVICE AREAS
- 6. ENTRY / EXIT

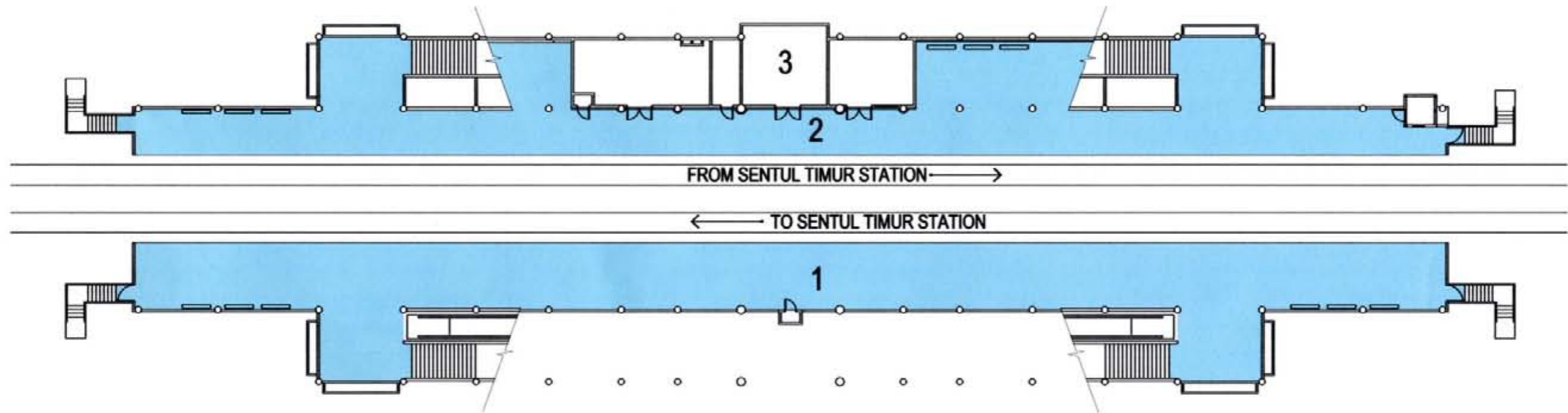


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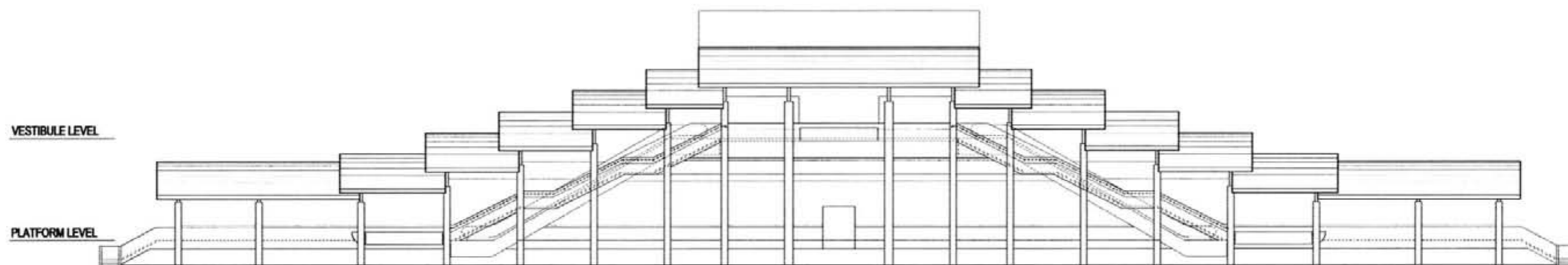
VESTIBULE LEVEL PLAN
SRI PETALING STATION

- 1. UPLINE PLATFORM
- 2. DOWNLINE PLATFORM
- 3. SERVICE AREAS



0 2 5 10 15 25

PLATFORM LEVEL PLAN
SRI PETALING STATION

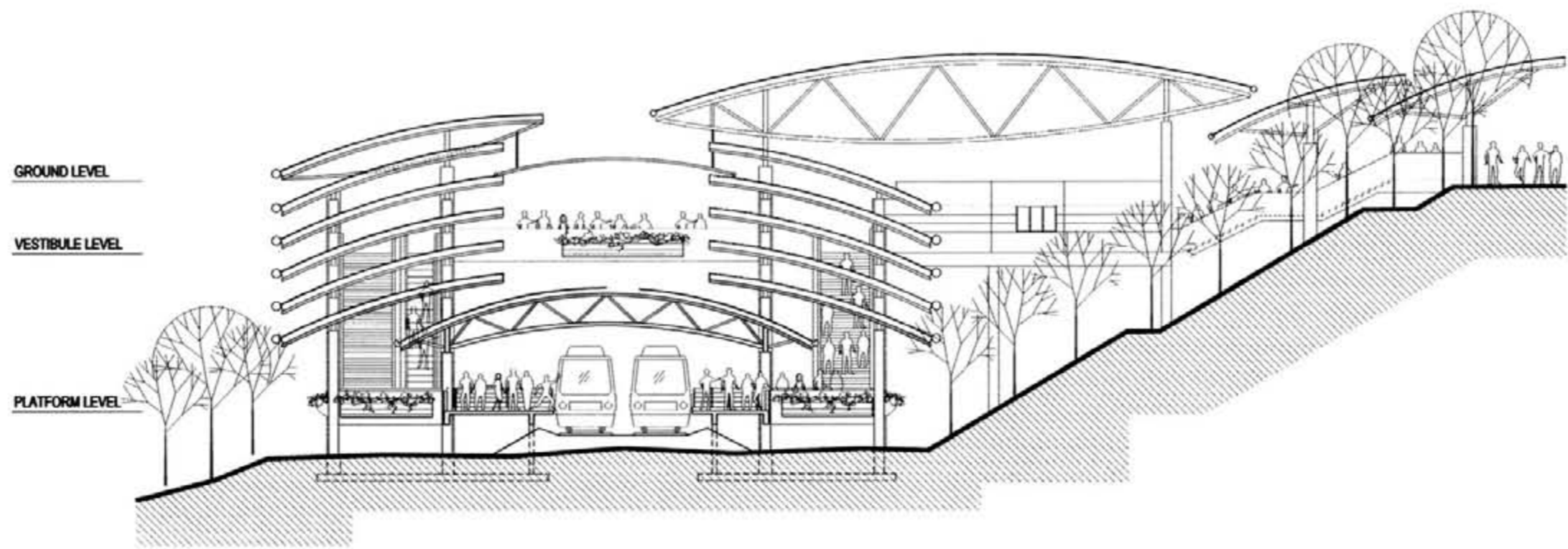


VESTIBULE LEVEL

PLATFORM LEVEL



ELEVATION
SRI PETALING STATION



CROSS SECTION
SRI PETALING STATION



Aga Khan Award for Architecture

ARCHITECTS RECORD

2007 AWARD CYCLE

I. IDENTIFICATION

Project Title Kuala Lumpur Light Rail Transit System I, Phase I & II
 Street Address Kuala Lumpur
 City Wilayah Persekutuan Country Malaysia

II. PERSONS RESPONSIBLE

A. Architect/Planner

Name Arkitek Kitas Sendirian
 Mailing Address 39-A Jalan Ipoh
 City Kuala Lumpur Postal Code 51200
 Country Malaysia Telephone 6-03-4042 1233
 Facsimile 6-03-4044 6212 E-mail tay_ks@kitas.com.my
 Principal Designer Tay Kiam Seng

B. Client

Name Sistem Transit Aliran Ringan (STAR) [now under Rangkaian Pengangkutan Integrasi Deras (RAPID KL)]
 Mailing Address 1 Jalan PJU 1A/46 off Jalan Lapangan Terbang Sultan Salahuddin Abdul Aziz Shah
 City Petaling Jaya, Selangor Darul Ehsan Postal Code 47301
 Country Malaysia Telephone 6-03-7650 7788
 Facsimile 6-03-7625 6667 E-mail suggest@rapidkl.com.my

C. Project Affiliates / Consultants

Please list those involved in the project and indicate their roles and areas of responsibility (e.g. engineers, contractors, economists, master craftsmen, other architects, clients, etc.) Please cite addresses and telephone numbers separately

Name	Role
Please refer to Appendix I	

III. TIMETABLE

(please specify year and month)

A Commission	<u>August 1994</u>		
B Design	Commencement	<u>August 1994</u>	Completion <u>August 1996</u>
C Construction	Commencement	<u>late 1993 (infrastructure)</u>	Completion <u>Dec 96 - Dec 98</u>
D Occupancy	<u>Line opened to public - Phase I : Ampang Station to Sultan Ismail Station - Dec 1996</u>		
	<u>- Phase IIa: Chan Sow Lin Station to Sri Petaling Station - Jul 1998</u>		
Remarks, if any:	<u>- Phase IIb: Sultan Ismail Station to Sentul Timur Station - Dec 1998</u>		

IV. AREAS AND SURFACES

(please indicate in square metres)

A Total Site Area	<u>Information not available.</u>
B Ground Floor Area	<u>Please refer to Appendix II for generic station area.</u>
C Total Combined Floor Area including basement(s), ground floor(s) and all upper floors)	<u>Please refer to Appendix II for generic station area.</u>
Remarks, if any:	

V. ECONOMICS

(please specify the amounts in local currencies and provide the equivalents in US dollars. Specify the dates and the rates of exchange in US dollars at the time)

	Amount in Local Currency	Amount in US dollars	Exchange Rate	Date
A Total Initial Budget				
B Cost of Land				
C Analysis of Actual Costs				
1 Infrastructure				
2 Labour				
3 Materials				
4 Landscaping				
5 Professional Fees	<u>RMB,800,000</u>	<u>1,520,000</u>	<u>2.50</u>	<u>1998</u>
6 Other				
D Total Actual Costs (without land)				
E Actual Cost (per sq meter)				

Remarks, if any, on costs:

VI PROJECT DESCRIPTION

Kuala Lumpur Light Rail Transit System I, Phase I & II

System I of the Kuala Lumpur Light Rail Transit System (KLRT) was operated by Sistem Transit Aliran Ringan (STAR). It consists of two phases. Phase I is approximately 12 kilometres long and runs from the Kuala Lumpur suburb of Ampang, terminating at Jalan Sultan Ismail in Kuala Lumpur. The first 9.5 kilometres of the route is at-grade utilising the existing, but disused Malayan Railways rail corridor while 2.5 kilometres is elevated. 13 stations were built for Phase I, including an administration building, a depot and stabling yard at Ampang.

Phase II is approximately 15 kilometres long, extending the elevated portion northwards by 3.2 kilometres from Jalan Sultan Ismail to the Kuala Lumpur suburb of Sentul Timur. It also extends 11.8 kilometres southwards to the Commonwealth Games Complex, which includes Bukit Jalil Station which serves the National Sports Complex, site of the 1998 Kuala Lumpur Commonwealth Games. 12 stations were built for Phase II including expansion of the Ampang Depot and stabling yard.

Arkitek Kitas Sendirian was involved in the design of all STAR LRT stations from schematic design to working drawing stage, excluding the Plaza Rakyat Station, which was designed by Skidmore Owens and Merrill (Chicago) as part of the Plaza Rakyat Development in Kuala Lumpur.

Since commencement of services, it has been used extensively by all Malaysians, visitors to Kuala Lumpur and tourists alike.

history of project

- 13 Nov 1992: STAR LRT incorporated to implement Kuala Lumpur's first LRT project.
- 22 Dec 1992: Franchise Agreement signed between STAR and the Government of Malaysia for the development, ownership and operation of the LRT system.
- 30 Aug 1994: Work on project officially commenced.
- 1998 – STAR LRT line open in stages; the line to the 1998 Kuala Lumpur Commonwealth Games Complex opens 11 July 1998.
- 1999 – during first year of operations, carries 26 million passengers.

notes post-completion of project:

- Dec 2002: Syarikat Prasarana Negara Berhad (SPNB) takes over ownership and operations of STAR LRT under the first phase of Kuala Lumpur's public transport restructuring exercise. STAR LRT is renamed STARline.
- Nov 2004: operations of STARline transferred to Rapid KL as part of Kuala Lumpur's public transport restructuring exercise.
- 19 July 2005: Rapid KL announces STARline renamed Ampang and Sri Petaling lines.

VII MATERIALS, STRUCTURE, AND CONSTRUCTION

Viaduct: prestressed concrete viaduct

Stations generally: base and platform is reinforced concrete frame, infill with brick or concrete masonry units with plaster finish. Finished with spray textured paint. Floors have homogeneous tile finish with use of yellow-striped tiles allowing users to stand within the safety zone on the platform.

Roof structure sits on reinforced concrete columns and consist of tubular steel members. Roofing is metal deck. Exceptions are:

- Masjid Jamek Station roof: made of Glass Reinforced Plastic
- Bukit Jalil Station roof: made of PVC coated polyester fabric with polymer coating

VIII. PROJECT SIGNIFICANCE AND IMPACT

Sistem Transit Aliran Ringan (STAR) Light Rail Transit (LRT) (now renamed RapidKL's Ampang and Sri Petaling Lines) was the first LRT system which began service in Kuala Lumpur. The stations were built on a limited/low budget. There wasn't LRT stations reserves *per se* during the initial planning stages of the LRT system. Station locations were almost *ad hoc*, over existing roads, train reserves, laybys, rivers, sloped areas and infrastructure, resulting in station locations in extremely tight and challenging situations. This has resulted in LRT stations having the following configurations:

- stations hugging the terrain
- stations cantilevering over the river
- stations spanning over the river
- stations spanning over existing roads

There are 2 generic types of stations. At-grade stations have the vestibule at train platform level on one or both sides. The elevated stations generally have the vestibule above ground level with the train platform above it. The design concept was influenced by the traditional Malay 'wakaf' or wayside rest stop. These were routinely dotted along routes between towns and villages. Typically a 'wakaf' would comprise simple exposed timber structure based on an open plan, with open sides, possessing layered roofs and occasionally resting on stilts.

This has been translated to the LRT stations being the 'wakaf' while the train becomes the 'journey' undertaken. The open plan concept using simple and clear layout with exposed structure resting on columns with minimal walls, and using steel to enable large spans has been adopted. This openness, along with the layered roofs takes advantage of natural daylighting, ventilation and affords open vistas to surroundings. Heat is channeled through convection currents escaping through the jack roof for larger roofs. This reduced the need for artificial illumination and ventilation, thus reducing the cost of energy consumed. Generous overhangs provide shade and give the feeling of lightness. The minimal surfaces also discourage vandalism.

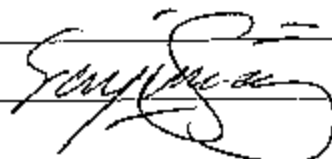
Steel and curved elements were used to project a progressive, forward-looking and modern interpretation of tropical architecture. The curved roofs were derived from the simple exposed fish-belly shaped trusses of the at-grade station platforms due to the need to channel water away from the trains. These further developed into different permutations like the dramatic 3-dimensional roof structure of Bukit Jalil Station, the double curved roof of Tasik Selatan and Bukit Jalil Station, and the elliptical shaped steel trusses and half-dished shaped ends of PWTC station.

The architects have strove to produce stations which are sensitive, sympathetic and responsive to the tropical environment, while possessing a consistency in architectural order, language, identification and unity. They have become nodes of the city, meeting places for people, points of reference of the city, as well as fulfilling the need of connecting the suburbs to Kuala Lumpur.

Please note: The submission of this Record is a prerequisite to candidacy for the Award. All information contained in and submitted with the Record will be kept strictly confidential until announcement of the Award is made. Subsequently, such material may be made available by the Aga Khan Award for Architecture and you hereby grant the Aga Khan Award for Architecture a non-exclusive licence for the duration of the legal term of copyright (and all rights in the nature of copyright) in the Material submitted to reproduce the Material or licence the reproduction of the same throughout the world.

Name (please print) Tay Kiam Seng

Signature



Date 11 September 2006

Kuala Lumpur Light Rail Transit System I Phase I

Concessionaire	: Sistem Transit Aliran Ringan Sdn Bhd
Architect	: Arkitek Kitas Sdn
	Principal-in-charge : Tay Kiam Seng
	Design Team : Amy IG Lim Chris Fredericks
	Assistants : Fadzilah Talib Jamil A Hamid Tang Siew Kim Yeong Kwong Meng Wagiman Saipan
Civil & Structural Engineer	: Genendra Ahmad Associates Sdn Bhd
Mechanical & Electrical Engineer	: Kvaerner Petrominco Sdn Bhd
Landscape Consultants	: Aroma Tropics Sdn Bhd
Viaduct Consultants	: Robert Benaim & Associates
Design Manager	: Symonds Travers Morgan (M) Sdn Bhd
Main Contractor	: Kuala Lumpur Transit Group Sdn Bhd
Main Subcontractor (Building & Civil Works)	: Taylor Woodrow Projects (M) Sdn Bhd
Main Subcontractor (Mechanical & Electrical Works)	: ABB Daimler-Benz Transportation (Projects) Sdn Bhd
Equipment Supplier	: ABB Daimler-Benz Transportation (Deutschland) GmbH
Independent Checking Engineer	: Acer Electrowatt Consultants

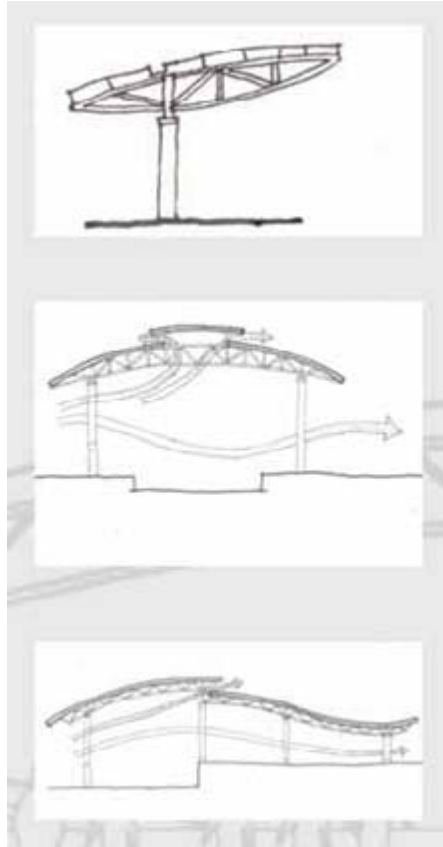
Kuala Lumpur Light Rail Transit System I Phase II

Concessionaire	: Sistem Transit Aliran Ringan Sdn Bhd
Architect	: Arkitek Kitas Sdn
	Principal-in-charge : Tay Kiam Seng
	Design Team : Amy IG Lim Chris Fredericks Najib Ariffin
	Assistants : Egado Roman Fadzilah Talib Jamil A Hamid Iselita Alvarez Wagiman Saipan
Civil & Structural Engineer	: Ove Arup & Partners International/ Arup Jururunding Sdn Bhd Consortium
Mechanical & Electrical Engineer	: Ove Arup & Partners International/ Arup Jururunding Sdn Bhd Consortium
Landscape Consultants	: Peter Tan Associates Sdn Bhd
North Viaduct Consultants	: Robert Benaim & Associates
Main Contractor	: Kuala Lumpur Transit Group Sdn Bhd
Main Subcontractor (Building & Civil Works)	: Taylor Woodrow Projects (M) Sdn Bhd
Main Subcontractor (Equipment Supplier)	: ABB Daimler-Benz Transportation (Deutschland) GmbH
Main Subcontractor (Mechanical & Electrical Works)	: ABB Daimler-Benz Transportation (Projects) Sdn Bhd
Independent Checking Engineer Engineer	: Acer Electrowatt Consultants Sdn Bhd

Floor Area of Selected Kuala Lumpur Light Rail Transit Stations

Station	Vestibule Area	Platform Area	Total Area
	(M ²)		
Sentul (Typical Elevated Station)	3,004	1,658	4,662
Titiwangsa (Typical Elevated Station)	1,779	4,186	5,965
Salak Selatan (Typical At-Grade Station)	-	-	1,816
Sri Petaling	3,309	3,168	6,477
Bandaraya	4,356	4,697	9,053
Tasik Selatan	-	-	5,598
Bukit Jalil	8,997	9,521	18,518
PWTC	5,205	2,896	8,101

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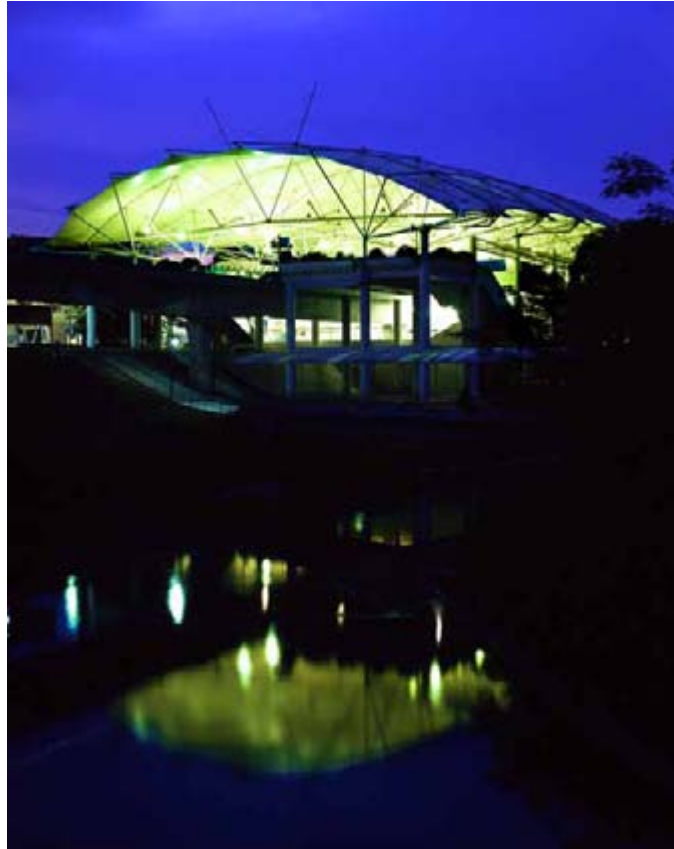
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MATERIAL IDENTIFICATION FORM

Provide a full list of all material being submitted

No	Description	Remarks
A	1) Architect's Record (4 pages)	
	2) Appendix I – Project Affiliates / Consultants	
	3) Appendix II – Areas and Surfaces	
	4) Image Identification Form	
B	Digital images of stations (14 x A4 pages)	
C	1) Kuala Lumpur Light Rail Transit System I, Phase I & II – Main Panel 1	
	2) Kuala Lumpur Light Rail Transit System I, Phase I & II – Main Panel 2	
	3) Kuala Lumpur Light Rail Transit System I, Phase I & II – Sri Petaling Station	
	4) Kuala Lumpur Light Rail Transit System I, Phase I & II – Bukit Jalil Station	
	5) Kuala Lumpur Light Rail Transit System I, Phase I & II – Tasik Selatan Station	
	6) Kuala Lumpur Light Rail Transit System I, Phase I & II – Salak Selatan Station	
	7) Kuala Lumpur Light Rail Transit System I, Phase I & II – PWTC Station	
	8) Kuala Lumpur Light Rail Transit System I, Phase I & II – Titiwangsa Station & Sentul Station	
	9) Kuala Lumpur Light Rail Transit System I, Phase I & II – Masjid Jamek Station	
	10) A3 sized Site Plans, Floor Plans, Elevations and Sections – Sri Petaling Station (5 x A3 pages)	
	11) A3 sized Site Plans, Floor Plans, Elevations and Sections – Bukit Jalil Station (5 x A3 pages)	
	12) A3 sized Site Plans, Floor Plans, Elevations and Sections – Tasik Selatan Station (3 x A3 pages)	
	13) A3 sized Site Plans, Floor Plans, Elevations and Sections – Salak Selatan Station (4 x A3 pages)	
	14) A3 sized Site Plans, Floor Plans, Elevations and Sections – PWTC Station (5 x A3 pages)	
	15) A3 sized Site Plans, Floor Plans, Elevations and Sections – Titiwangsa Station (5 x A3 pages)	
	16) A3 sized Site Plans, Floor Plans, Elevations and Sections – Sentul Station (5 x A3 pages)	
	17) A3 sized Site Plans, Floor Plans, Elevations and Sections – Masjid Jamek Station (5 x A3 pages)	
	18) A3 sized Site Plans, Floor Plans, Elevations and Sections – Bandaraya Station (5 x A3 pages)	
D	CD Rom of digital images and power point presentation for main panels and selected stations	
E	Curriculum Vitae of Arkitek Kitas Sendirian	

IMAGE IDENTIFICATION FORM

List each digital image (or photograph or slide) below, and specify the name of the photographer and the date of photography. In the space designated "Description", provide a description of the image in English or in French. Also specify any copyright restrictions, if any. You may substitute this form with your own as long as the required information is included.

No	Description	Photographer	Date
1	Sri Petaling Station	Steven Shea	1999
2	Sri Petaling Station (view from Southwest)	Danny Sim	2000
3	Sri Petaling Station (view from Southeast)	Danny Sim	2000
4	Bukit Jalil Station (view from Commonwealth Park)	Steven Shea	1999
5	Bukit Jalil Station (night scene)	Danny Sim	2000
6	Bukit Jalil Station (view from approach road)	Tay Kiam Seng	1998
7	Bukit Jalil Station (interior view)	Steven Shea	1999
8	Tasik Selatan Station (view from entry walkway)	Chris Fredericks	2000
9	Tasik Selatan Station (interior view)	Steven Shea	1999
10	Salak Selatan Station (night scene)	Chris Fredericks	2006
11	Salak Selatan Station (view of platform)	Chris Fredericks	2006
12	Bandaraya Station (view from Southwest)	Steven Shea	1999
13	PWTC Station (aerial view)	Steven Shea	1999
14	PWTC Station (view from Northeast)	Steven Shea	1999
15	PWTC Station (view from Jalan Putra)	Steven Shea	1999
16	PWTC Station (view towards Gombak River)	Steven Shea	1999
17	PWTC Station (interior view)	Steven Shea	1999
18	Sentul Station (night scene)	Chris Fredericks	2006
19	Titiwangsa Station (aerial view)	Tay Kiam Seng	2000
20	Titiwangsa Station (view from Southeast)	Steven Shea	1999
21	Titiwangsa Station (view from Southwest)	Steven Shea	1999