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Admiralty Station four-way interchange – planning through to preliminary design

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ABSTRACT

Admiralty Station (ADM) has been the busiest station on the Hong Kong rail network since the opening of the Island Line (ISL), with its cross-platform interchange to the Tsuen Wan Line (TWL). This two-way interchange station has now become an even busier four-way interchange, following the completion of the South Island Line (SIL) and the Shatin-to-Central Link (SCL). This paper gives some of the history of these two new lines and describes the various schemes for interchange at Admiralty, leading to the arrangement developed in the Preliminary Design, which was adopted. The main planning objective for the expanded Admiralty Station was to make interchanges between the four lines as convenient as possible, with sufficient capacity and space to avoid over-crowding. A secondary objective was that the works for the SIL and SCL should avoid any significant effects on the operation of the ISL and TWL during construction. The expansion of ADM was completed in two stages, with the South Island Line opening in December 2016, and the Shatin-to-Central Link (North South Line), opening in May 2022. It is observed that the railway system is operating smoothly, and the interchange arrangement has been well received by the public.

KEYWORDS Admiralty Station; South Island Line; Shatin Central Link; Fourth Harbour Crossing; four-way interchange; station planning; preliminary design

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Received 13 April 2023

1. Introduction

1.1. Background

Admiralty Station (ADM) has been the busiest station on the Hong Kong rail network since the opening of the Island Line (ISL), with its cross-platform interchange with the Tsuen Wan Line (TWL). This two-way interchange station has now become an even busier four-way interchange, following the completion of the South Island Line (SIL) and the Shatin-to-Central Link (SCL).

This paper gives some of the history of these two new lines and describes the various schemes for interchanges at Admiralty, leading to the arrangement developed in the Preliminary Design, which was adopted. The main planning objective for the expanded Admiralty Station was to make interchanges between the four lines as convenient as possible, with sufficient capacity and space to avoid over-crowding. A secondary objective was that the works for the SIL and SCL should avoid any significant effects on the operation of the ISL and TWL during construction.

The design philosophy of ADM can perhaps be best summed up as "the passenger comes first". This must be balanced against the capital and operating costs. Thus, the aim is to come up with a cost-effective design that makes the station convenient and attractive to passengers.

1.2. Consideration of a Fourth Harbour Rail Crossing

In the mid-90s, it became apparent that a Fourth Harbour Crossing was likely to be needed within the next 20 years. In the late 90s, MTRC developed this as part of the East Kowloon Line (MTRC, 1998), which was envisaged to run from Diamond Hill to Admiralty, with six intermediate stations, and major interchanges at Hung Hom, Exhibition and Admiralty.

The Second Railway Development Study (RDS-2) (RDO, 1998-2000) considered the above MTRC scheme, together with others that included an extension of the East Rail line as the Fourth Harbour Crossing.

The committed rail network at the time of RDS-2 consisted of the following, as indicated in Figure 1:

- East Rail (ER) from Lo Wu to East Tsim Sha Tsui, plus the Lok Ma Chau Spur;
- West Rail (WR) from Tuen Mun to Nam Cheong;
- Kwun Tong Line (KTL) from Yau Ma Tei to Tiu Keng Leng;
- Tsuen Wan Line (TWL) from Tsuen Wan to Central;
- Island Line (ISL) from Sheung Wan to Chai Wan;
- Tung Chung Line (TCL) from Tung Chung to Hong Kong Station;
- Airport Express from Hong Kong Airport to Hong Kong Station;
- Tseung Kwan O Line (TKOL) from Po Lam/Tseung Kwan O South to North Point; and
- Ma On Shan Line (MOSL) from Lee On to Tai Wai.

Figure 1. Existing and committed rail network in 2000.

1.3. North Island Line

RDS-2 included a line running along the north shore of Hong Kong Island, as an extension of the Tung Chung Line, with new stations at Tamar, Exhibition and Victoria Park. In order to minimise congestion at North Point, the main interchange station between the Island Line and the Tseung Kwan O Line, it was proposed that the two lines be "swapped", as follows:

- The Tung Chung Line would connect to the eastern half of the Island Line at Fortress Hill, so that TCL trains would run from Tung Chung to Chai Wan.
- The TKO Line would connect to the western half of the Island Line at Tin Hau, so that trains from Tseung Kwan O would run through to Sheung Wan.

This North Island Link / "Swap" would relieve both the Island Line and the Tsuen Wan Line; the "Swap" arrangement matches the lower line flows of the eastern Island Line with the lower capacity of the Tung Chung Line. The section of new line from the existing TCL terminus at Hong Kong Station to Fortress Hill is known as the North Island Line.

1.4. Sha Tin to Central Link

As a result of RDS-2, the government decided that the Fourth Harbour Crossing should form part of a link connecting Sha Tin to Admiralty and, in 2000, it invited the two rail corporations to each submit a bid for the Shatin to Central Link (SCL). The SCL was to consist of three elements, which could be formed by one or more lines:

- A connection from the Shatin area to the existing urban rail network at Diamond Hill, to relieve the most congested section of East Rail, between Tai Wai and Kowloon Tong.
- The East Kowloon Line (EKL), from Diamond Hill to Hung Hom, via stations at Ho Man Tin, Ma Tau Wai, To Kwa Wan and Kai Tak.
- The Fourth Harbour Crossing (FHC) from Hung Hom to Admiralty, via Exhibition.

The two rail corporations submitted bids in 2001, and KCRC's bid was selected by the government in June 2002. KCRC then proceeded with the design of their scheme.

1.5. Merger studies

However, in 2004, it was decided that the two rail corporations would merge – this meant that the extensive effort by the two corporations in preparing their respective SCL Bids was wasted, and that most of the design work carried out by KCRC from 2002 to 2004 was similarly abortive.

In the Merger Studies (KCRC and MTRC, 2004), it was agreed that the preferred scheme was to be:

- An extension of East Rail, as a nine-car railway, from Hung Hom to Admiralty via a new station at Exhibition. This extension of the East Rail line forms the SCL. The vertical alignment of the cross-harbour section requires that the East Rail line be underground at Hung Hom.
- An extension of the Ma On Shan Line (MOSL) from Tai Wai to Hung Hom (via Diamond Hill and the East Kowloon Line), then via East Tsim Sha Tsui and Austin to Nam Cheong to join West Rail. This forms the East-West Line, running from Tuen Mun in the west to Wu Kai Sha in the east. Eight-car trains are assumed.

Interchanges with the SCL would be provided at:

- Diamond Hill, with the Kwun Tong Line;
- Ho Man Tin, with the proposed extension of the Kwun Tong Line to Whampoa;
- Hung Hom, with the East-West Line;
- Exhibition, with the proposed North Island Line; and
- Admiralty, with the Tsuen Wan Line, the Island Line, and the proposed South Island Line.

1.6. South Island Line

Following the completion of RDS-2, the government published the Railway Development Strategy (RDO, 2000) which identified the South Island Line (SIL) as an addition to the MTR network to serve the Southern District of Hong Kong Island.

2. Fourth Harbour Crossing

2.1. Why ADM for SCL interchange?

It is essential that the SCL has good interchanges with other lines on Hong Kong Island. The most important of these is the Island Line; the next most important one is the proposed North Island Line. As described above, the chosen SCL scheme has interchanges with the Island Line at Admiralty and with the North Island Line at Exhibition.

The original MTR planning in the 1970s envisaged that the East Kowloon Line would terminate at Sheung Wan. However, this option was ruled out, as it would require the cross-harbour tunnels for the EKL to cross under the TCL/Airport Express immersed tube, making the vertical alignment impossible.

The main alternative considered in RDS-2 was for the SCL to interchange with the North Island Line at a new station in Victoria Park, and to then continue south, then west, to terminate at Central West, with intermediate stations at Leighton Hill, Wanchai South, and Hong Kong Park. Convenient interchange with the Island Line was not possible under this option.

Compared to the chosen option, the alignment via Victoria Park was estimated to be significantly more expensive and, despite the increase in catchment, was found to attract fewer passengers.

2.2. Earlier schemes for SCL at ADM

The EKL Feasibility Study (MTRC, 1999), assumed an alignment similar to that now constructed, with an intermediate station at Exhibition, and a station at Admiralty just to the east of the existing TWL/ISL station, as shown in Figure 2 below. The two tracks and platforms were stacked, and the interchange between SCL and ISL/TWL was reasonably convenient. The line could be extended to a possible future station at Central West (CEW).

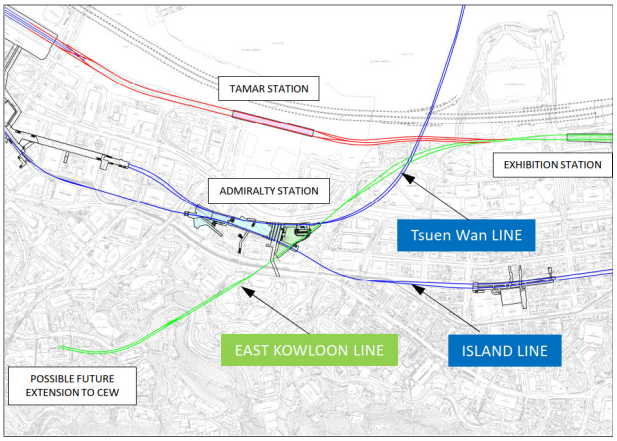

Figure 2. Location plan of Admiralty Station.

Both RDS-2 and the MTRC SCL proposal (MTRC, 2001) adopted a similar arrangement.

The KCRC SCL Proposal (KCRC, 2001) put the station in the Tamar development site, with a single subway connecting it to ADM, providing a poor interchange to ISL/TWL. However, KCRC's subsequent preliminary design then had the station in a similar location to that in RDS-2.

3. South Island Line

3.1. Why ADM for SIL interchange?

Various options for SIL stations on the north side of the island were considered. Similar to the SCL, it was considered essential that convenient interchanges be provided with other lines. However, it was even more important than for the SCL that the SIL had good interchanges with the Tsuen Wan Line as well as the Island Line. Options for the SIL terminus at Wanchai or Sheung Wan were ruled out as they only provided interchange with the Island Line, and were no less technically difficult than going to ADM. Wanchai was also considered as an intermediate station, with the SIL terminus at ADM, but this added considerably to the cost, without any significant benefit.

An intermediate station at Happy Valley was ruled out, as the population in the lower and middle parts, that could realistically be served, is less than 20,000, and transport by bus, minibus and tram is already sufficient. Although these services can be slowed by traffic congestion, distances are short to the major commercial centres of Hong Kong.

The obvious location for the SIL terminus was ADM. Given that it had been decided that the SCL would come to ADM, this made ADM even more attractive as the terminus of SIL. However, it did mean that ADM would become a four-way interchange station, making its design more complex.

3.2. Assumed arrangement for the SIL and SCL at ADM

The West Island Line/South Island Line (WIL/SIL) Feasibility Study (MTRC, 2004) located the SIL station under Queensway, separate from both the SCL and TWL/ISL, with 100 m long interchange passageways both to the existing TWL/ISL station, and to the SCL station - see Figure 3. This location assumed that the SCL would be a KCRC railway.

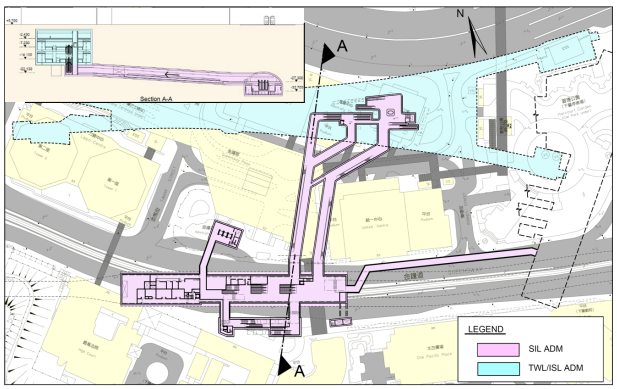

Figure 3. Proposed location and section of the SIL Station in the WIL/SIL Feasibility Study (2004).

The Merger Studies, later in 2004, stated: "Although the WIL/SIL Feasibility Study has proposed a station location under Queensway, the opportunity could now be taken to consider an integrated location." The location of the SIL Terminus chosen in the Merger Studies was immediately to the west of the SCL platforms and just to the south of the existing TWL/ISL station box, as indicated in Figure 4 below.

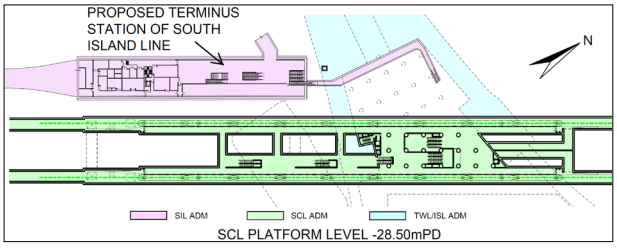

Figure 4. Proposed location of the SIL Station in the Merger Studies (2004).

4. Four-way interchange

4.1. Length of trains

The maximum SIL line flow in 2031 is forecast to be 15,500/hour, with an assumed ultimate flow of approximately 17,500/hour. To cope with this flow, it was decided to use trains comprising three cars of the same dimensions as existing MTR Urban Lines. Assuming a capacity of 250 per car, and 30 trains per hour, the line capacity would theoretically be 3 x 250 x 30 = 22,500/hour. This extra capacity will be useful to cater for peak-within-peak flows, i.e., flows within the peak hour that are greater than the average for the hour.

Three-car trains are approximately 68 m long, and this determines the SIL platform length. The SCL trains are nine cars, requiring platforms that are 216 m long.

4.2. Station planning considerations

It was understood that Admiralty would become the busiest station on the Hong Kong Railway network, with long-term flows of 120,000 per hour, and more than a million passengers per day. To be able to handle these very large flows, the station planning needed to ensure that:

- There is sufficient capacity to handle the flows without any significant queuing time at escalators, etc., but with sufficient space to minimise conflicts and congestion, and to comfortably accommodate any queues that do form. The capacities of escalators, platforms, passageways, etc. need to be in accordance with the MTR Design Standards Manual (MTRC, 1997).
- Any cross flows can be minimised.
- The interchange movements are as convenient as possible.
- The phasing arrangements need to be flexible enough to allow the SIL to open several years before the SCL, without affecting the operation of the existing lines, whilst complying with all the latest design and statutory requirements.
- The existing TWL and ISL platforms, and the interchange routes between them, should be improved wherever possible.

4.3. Major physical constraints

In determining the horizontal and vertical alignment of the tracks within the station, the following major physical constraints had to be considered, as highlighted in Figure 5:

- Existing TWL and ISL tracks and finger platforms, and their bored tunnels to the east of the platforms;
- Existing MTR Substations, one at ground level, the other underground;
- The cut-and-cover section of the enlarged station is assumed to keep to the west of the northern part of Harcourt Garden Underground Car Park;
- The tunnelled sections of the enlarged station are assumed to pass under the southern part of Harcourt Garden Underground Car Park Rodney Block;
- United Centre foundations;
- Pacific Place foundations;
- The existing subway to Pacific Place 3;
- The proposed footbridge over Queensway from Pacific Place;
- Harcourt Road Footbridge; and
- Foundations of the Fenwick Pier Street Flyover.

All schemes considered in the Preliminary Design (MTRC, 2009) assumed that a major part of the enlarged station would be built using cut-and-cover, in the trapezoidal-shaped area of green shading in Figure 5, which is bounded by:

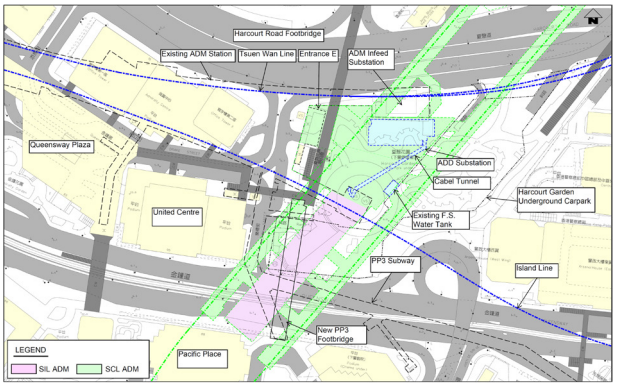

Figure 5. Admiralty Station - interfaces.

- To the west, the east wall of the existing station;
- To the north and south, the finger platforms of TWL and ISL, respectively;
- To the east, the Harcourt Garden Underground Car Park. The cut-and-cover box wall is assumed to keep clear of this by 1.5 metres.

This has a total area of approximately 7,300 m^2 and is at least 40 m deep for all the schemes considered.

During the preliminary design, six options for the complete station (i.e., including the SCL) were developed, and Figure 6 shows cross-sections of the tunnelled sections of the platforms, to the south of the trapezoidal cut-and-cover box mentioned above.

Option 1 was an early option for the SIL station - it was aimed to be completely independent of the SCL. It had all the plant rooms contained within the SIL cavern, and passenger links to the existing station via adits running under the existing station base slab to minimise the area occupied in the cut-and-cover area. This option was not considered further as it had several disadvantages, including the fact that the cavern extended well under Pacific Place, with insufficient clearance to the foundations.

For all the other station layout options, it was assumed that most of the plant rooms and the vertical links up to the existing TWL/ISL platforms would be located within the trapezoidal cut-and-cover box.

Options 2, 5 and 6 - SIL and SCL tracks parallel, and at same level.

Option 2 was developed from Option 1. In order to allow SCL construction at a later stage, provisions were made to facilitate the future connections with the SCL.

The alignment and station layout for the SIL and SCL run in parallel, and at the same level, in this option. The SIL station layout and location are very similar to those of Option 1 except the cavern length is minimised and most of the plant rooms are located in the cut-and-cover section.

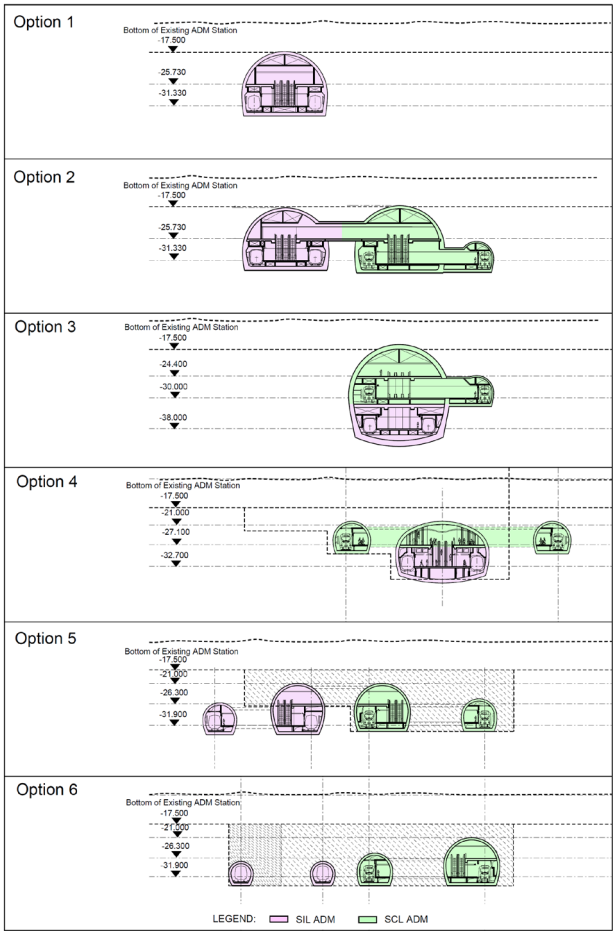

Figure 6. Cross-sections of tunnelled platforms for the SIL and SCL - Options 1 to 6.

The SCL station is located on the east side of the SIL at the same level, with platforms at -31 mPD, and the track centres are 30 m apart. The platforms are made up of a combination of different sections including cavern, cut-and-cover section, and platform tunnels. Escalators, lifts and staircases are provided at the cut-and-cover section for vertical circulation between the SCL platform and different levels of the existing ADM.

Two interchange adits are provided between the SIL and SCL station caverns at their transfer concourses. It was noted that it would be possible to keep the tracks in much the same locations, but reduce the size of the caverns, which is Option 5.

Option 5 reduces the cavern size to improve constructability. It is achieved by splitting one of the SIL tracks into a platform tunnel and relocating the tunnel ventilation from ADM to the ventilation shaft at Hong Kong Park.

Option 6 is a further development of Option 5 but with the SIL platform moved into the cut-and-cover section as much as possible, with the aim of minimising cost and interchange distance for SIL passengers. However, as this layout had insufficient space at the SIL concourse/SCL

platform level for passenger circulation and for the required number of escalators, this option was rejected.

Options 3 and 4 - stacked schemes

The station layout in **Option 3** is significantly different from that in Options 1 and 2, as the SIL platform is located beneath the SCL platform in a stacked arrangement to form an integrated station in a large cavern section.

The cut-and-cover section is adopted in the middle part of the SCL platform in this option. The southern part of the SIL/SCL station comprises a large cavern, 26 m wide, with three levels to accommodate the SIL platform at the lowest level, SCL platform at the intermediate level and a transfer concourse at the highest level. On the eastern side, an 8.5 m wide platform tunnel accommodates the other SCL track, with a platform of 3 m minimum width.

The transfer concourse at the highest level serves the SIL/SCL passenger flows to the existing ADM's upper platform (and a possible connection with the Pacific Place subway).

This option has some disadvantages:

- The SIL platform level is the lowest of all the options, so all SCL and SIL passengers have to travel further vertically, reducing passenger convenience, particularly for interchange with ISL/TWL.
- The cavern cross-section size is the largest of all options, resulting in higher risk.

In view of these disadvantages, Option 3 was rejected in favour of Option 4 below.

Option 4 re-arranges the station layout and cavern arrangement to address the above disadvantages of Option 3. The major development of Option 4 is to split the SIL and SCL platforms into three separate sections:

- a platform tunnel for the eastern track of the SCL;
- another platform tunnel for the western SCL track, with a 55 m offset from the eastern track; and
- a two-level cavern, located centrally between the two SCL platform tunnels, with the SIL platforms at the lower level and a common concourse at the upper level for both the SIL and SCL.

Whereas this option has the SCL tracks at 55 m centres, as shown in Figure 7, all the other options have them 30 m apart (indicated by the purple lines in Figure 7), similar to the 28 m spacing in the Merger Studies. The alignment of the western SCL track was governed by the need for the tunnel from the north to avoid the Red Cross HQ on the north side of Harcourt Road and for the platform tunnel to avoid the foundations of United Centre, while the eastern track was aligned to keep to the west of the deep piles of the first column of the flyover from Harcourt Road to Fenwick Pier Street.

The much wider spacing was achieved by moving the eastern SCL track to the next span of the flyover, a distance of over 20 m. With this option, the eastern track/platform runs underneath the underground car park, i.e., to the east of the deep station cut-and-cover box, and therefore needs to be in a platform tunnel throughout its length.

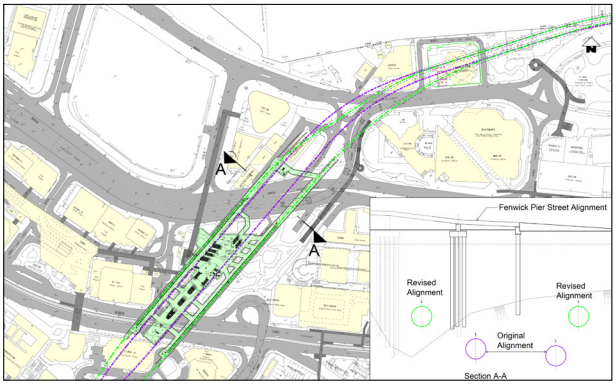

Figure 7. Proposed SCL alignment layout (Option 4).

4.4. Selection of the preferred option

Options 4 and 5 were found to be superior to the other options in all important respects, and a more detailed comparison of the two options was carried out. Both Options 4 and 5 have as their basis the fact that the SCL would be constructed after the SIL, as was the case.

A key difference between these two options was the SCL's track spacing. The 30 m track spacing of Option 5 seemed reasonably generous, given that a typical MTR island platform station has tracks with 16 m centres. However, given that many of the interchange escalators need to run perpendicular to the two tracks and their platforms, this leaves relatively little room for circulation and any queueing at the escalators, and Option 4 was considered much better in this respect.

Other advantages of Option 4 are:

- A more integrated SCL/SIL station with more common areas and shared facilities, including the vertical circulation elements, leading to a reduction in overall floor area.
- Better interchange between the SIL and SCL.
- Although the SIL platform is about 1 m lower than for Option 5, the SCL platforms are about 5 m higher. As the SCL has much higher flows than the SIL, this will reduce the overall interchange times significantly.
- Less relocation of major plant rooms within the existing station was needed for the construction of the SIL; this could be carried out over a longer timescale as part of the SCL works.

Option 4 was therefore selected.

5. Final station layout

As shown on the isometric view in Figure 8, the scheme integrates the SIL and SCL stations, to facilitate interchange with ISL and TWL. The station layout comprises four main parts: cut-and-cover section, SIL station cavern, and the two SCL platform tunnels.

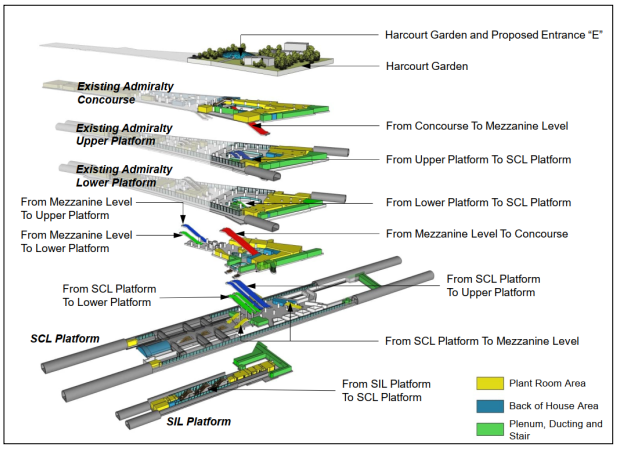

Figure 8. Isometric diagram - final scheme.

The cut-and-cover section, the trapezoidal area shaded green in Figure 5, accommodates the great majority of the vertical links connecting SIL/SCL to the existing station, as well as most of the SIL/SCL plant rooms. Figure 9 is a plan at the SCL platform level, and it shows the locations of Sections A-A and B-B, which are themselves shown on Figures 10 and 11 respectively.

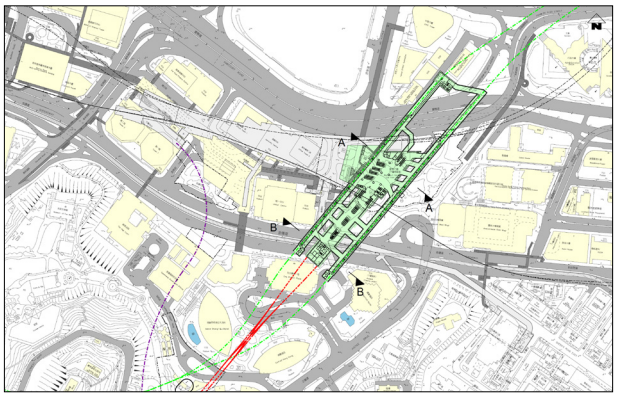

Figure 9. Plan at SCL platform level.

The southern part of the SIL/SCL station, comprising the SIL and SCL platforms, is split into three separate sections (see Figure 11):

- a 9.8 m span platform tunnel for the eastern track of the SCL.
- another 9.8 m span platform tunnel for the western SCL track. The distance between the centres of the two SCL tracks is 55 m.
- a 24 m span cavern, with the SIL platforms at the lower level and a common concourse at the upper level for both the SIL and SCL.

The following constraints dictate the level of the proposed station cavern:

- the underside of the bottom slab of the existing ISL and TWL finger tunnels at -17.6 mPD, and the underside of the TWL running tunnel (bored tunnel) at -17.5 mPD;
- the founding level of the mini-piles of the existing underground carpark (Rodney Block) at Harcourt Garden, with the lowest level at -14.1 mPD;
- the existing piles of Pacific Place One are embedded into the rock stratum down to -15.5 mPD;
- the pile toe level down to -12.0 mPD of the proposed new footbridge extension from the existing footbridge at Harcourt Garden to Pacific Place One.

In order to provide sufficient rock cover above the station cavern, the proposed levels of the SCL platform and SIL(E) platform are at -27.1 mPD and -32.7m PD.

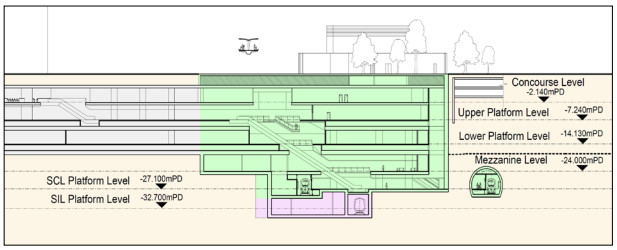

Figure 10. Section A-A through cut-and-cover box.

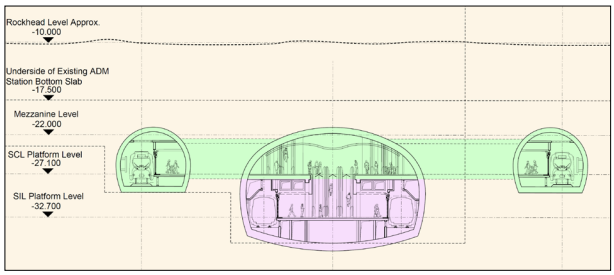

Figure 11. Section B-B through platform tunnels.

The SCL platforms are at the same level as the SCL/SIL shared concourse - this minimises the vertical travel distance, making for more convenient interchange with ISL/TWL, and it allows the SIL and SCL to share circulation areas and vertical circulation elements. Figure 12 shows the shared SIL/SCL concourse, and Figure 13 shows the main passenger flows at this level.

Figure 12. Photo of the shared SIL/SCL concourse at SCL platform level.

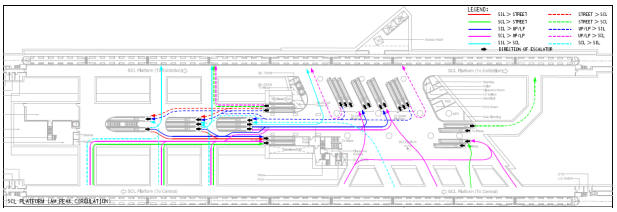

Figure 13. Main passenger flows at the SIL/SCL concourse.

Based on the patronage forecasts, the minimum number of escalators required between the SIL and SCL platforms in the ultimate case is five; and the number required between the SCL platform and the levels above is 15. All SIL and SCL passengers will need to use these 15 escalators to access TWL, ISL or the street. Even with the 55 m track spacing providing a large space at SCL platform level within the cut-and-cover box, there were concerns about conflicts and congestion in this area. It was therefore decided to introduce a transfer level (mezzanine level), 5 m above the SCL platform, with eight escalators connecting these two levels, to divert some of the passengers away from this area of concern.

Furthermore, in order to reduce passenger queueing/inconvenience at the areas in front of the escalators, it was decided to provide a total of 34 new escalators, instead of the minimum requirement of 28. These escalators are split into five groups:

- eight escalators between the SIL platform and SCL platform level;
- ten running directly from the SCL platform level up to either the lower or upper platform levels of the existing station;
- another eight from the SCL platform level to the mezzanine level for the purpose of diverting passengers away from the area with ten escalators mentioned above;
- four from the mezzanine level to the concourse, stacked above the 10 escalators mentioned above; and four from passageways at the mezzanine level running under the ADM base slab, with two escalators each up to the middle part of the two existing platform levels.

The nine-car, 216 m long SCL platform tunnels extend northwards beyond the cut-and-cover section, and originally both passed beneath the existing TWL tunnels. However, where the eastern SCL tunnel crosses under the existing TWL tunnel, it passes through mixed ground.

In order to minimise any potential impacts on the TWL tunnel, it was decided to shift the platform end of the eastern SCL track 20 m southwards. This means that the tunnel section under the existing TWL tunnel can be reduced to a running tunnel size with a 6.5 m internal diameter, and that it can be constructed using the TBM method. This also has the advantage that it removes the need for any soft ground tunnelling under the existing carpark.

6. Summary

Admiralty Station has been the busiest station on the Hong Kong Rail network since the opening in 1985 of the Island Line, with its cross-platform interchange to the Tsuen Wan Line.

In a succession of major railway planning studies from the late 90s, it was assumed that the Fourth Harbour Rail Crossing would run from Hung Hom to Admiralty via Exhibition. Initially, it was thought that this would be formed by an extension of the East Kowloon Line (now part of the Tuen-Ma Line); subsequently, it was decided that it would be an extension of the East Rail line.

The WIL/SIL Feasibility Study in 2004 recommended that the South Island Line, with stations at South Horizons, Lei Tung, Wong Chuk Hang and Ocean Park, should terminate at Admiralty.

This meant that Admiralty would become a four-way interchange, and the Preliminary Design, carried out in 2007 to 2009, aimed to:

- make interchanging between the SCL, SIL, ISL and TWL as convenient as possible, with sufficient capacity and space to avoid overcrowding;
- avoid any significant effects on the operation of the ISL and TWL during construction;
- allow the SCL construction to be carried out either after or at the same time as for the SIL;
- be cost-effective; and
- minimise construction impacts and resumption.

Of these objectives, the key to success for ADM was to provide convenient interchange between the four lines, with sufficient capacity to handle the flows comfortably. The station is already handling more than 100,000 passengers in both the morning peak and afternoon peak hours. The current scheme has added a total of 34 escalators to take passengers to various platforms for interchange.

As part of the preliminary design, the new entrance in Harcourt Garden was identified as the one location where

it would be possible to bring natural light into this very deep station, and the final design has realised this to good effect-see Figure 14, which shows the escalators linking the SCL platforms up to the lower TWL/ISL platforms.

With the recent commissioning of the SCL North South Line, it is observed that the railway system is operating smoothly, and we believe that the innovative planning of ADM was a key part of this success.

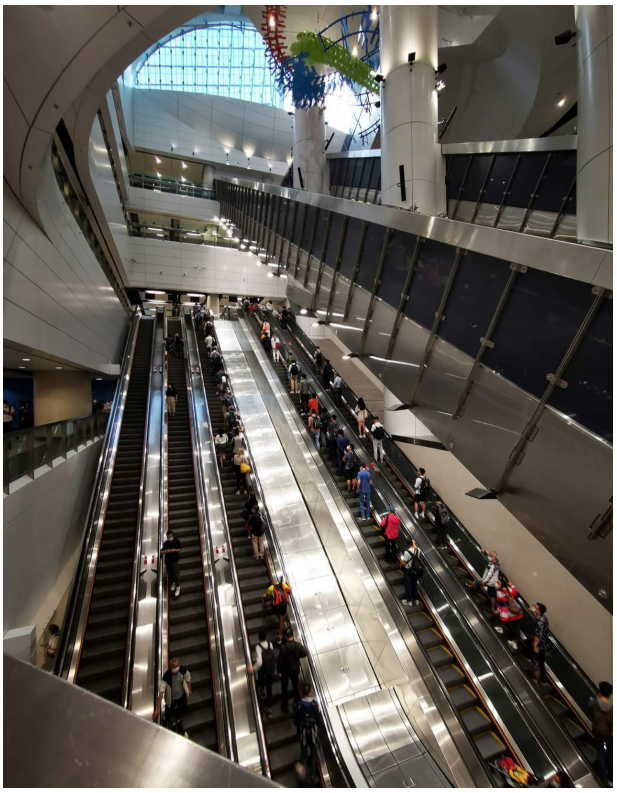

Figure 14. Photo of escalators linking the SIL/ SCL concourse to TWL/ISL lower platform, with natural light from the glazed roof of the Harcourt Garden entrance.

Notes on contributors

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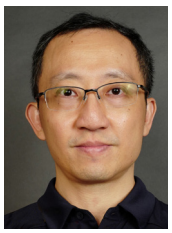
Ir Jack Yuk Lam Li graduated from The University of Hong Kong, Department of Civil and Structural Engineering. He is currently an Executive Director of AECOM Transportation Business Line, having 32 years of experience in project management and the design of large-scale civil works projects in Hong Kong, Mainland China and Singapore. He specialised in the railway sector and has led the design team for successful delivery of a number of major railway projects. He was the Deputy Design Team Leader for the preliminary design of the South Island Line (East) project and was involved in the planning of Admiralty Station.



Mr Wai Tat Wong received his Architecture Degree at The University of Melbourne, Australia. He has over 20 years of experience in the architectural field with an emphasis on transportation projects. He has worked on railway projects in Hong Kong, Dubai, London as well as China. He was a Senior Architectural Designer for the Hong Kong International Airport Terminal 2 Skyplaza Project and is currently a Senior Project Architectural Manager at the Hong Kong MTR in charge of new railway development projects. He was heavily involved in Admiralty Integrated Station and SCL Enabling Works projects for the South Island Line (East) and Shatin Central Link. He was involved in the design of Admiralty Station since 2003, working from feasibility and preliminary design stages as a design consultant, and he worked on the project management team from the detailed design and construction stages to handle the project until the final completion and opening.

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