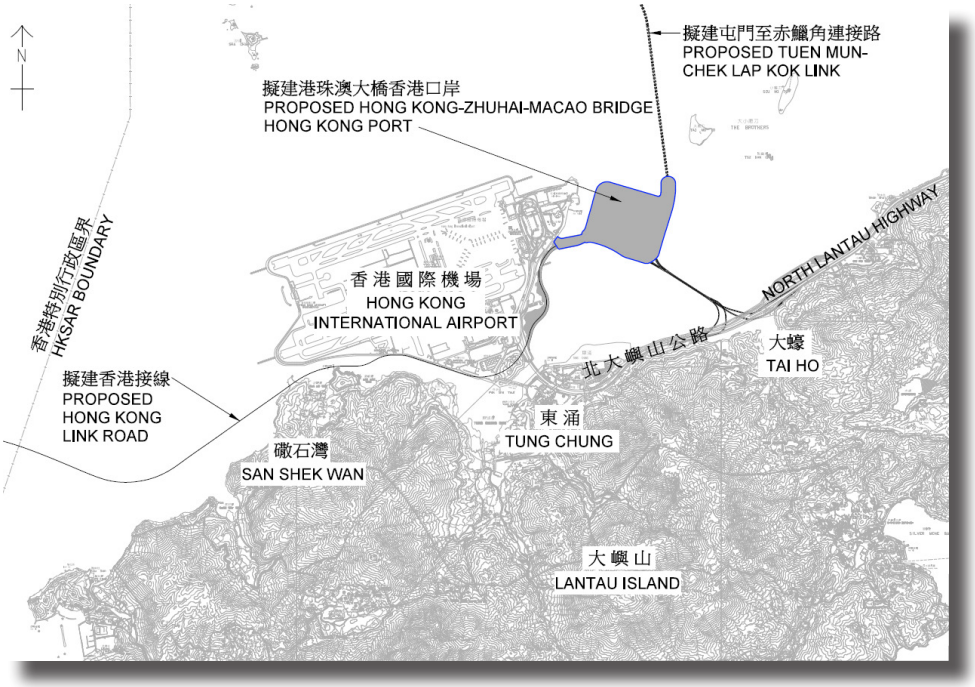
Environmental Management

Our management philosophy puts the environment in front of all project activities. We maintain an Environmental Management System to identify and control the environmental aspects at all stages of our work.

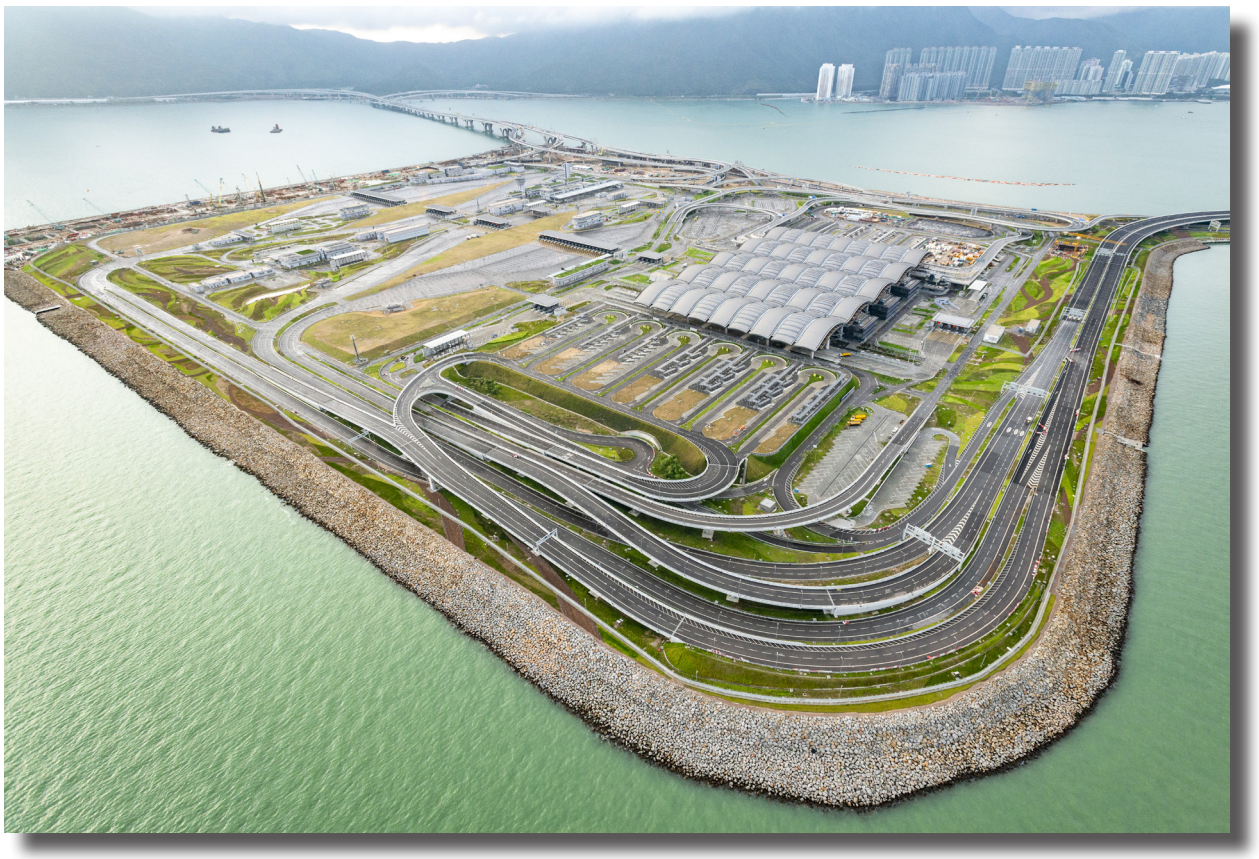
Environmental Consideration during the Design and Construction Stage of the Passenger Clearance Building Iconic Roof

The Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Port is located on an artificial island of about 150 hectares (including about 20 hectares of land for the southern landfall of Tuen Mun-Chek Lap Kok Link) reclaimed from the open waters off the north-east of the Hong Kong International Airport. It serves as a transportation hub and provides port clearance facilities for passengers and goods using the HZMB.



Location of HZMB Hong Kong Port

Being a landmark of the HZMB Hong Kong Port, the Passenger Clearance Building is the largest among all structures on the artificial island. Its total floor area measures over 90,000 square meters. The roof of the Passenger Clearance Building was designed to imitate undulating waves, matching the sea surrounding the HZMB Hong Kong Port island. It is a structural steel structure and is supported by tree-like structural columns with few interior structural columns to enhance the feeling of spaciousness in the arrival and departure halls. Structural steel is a recyclable material and generally has a lower carbon footprint when comparing with concrete material. Skylights are provided on the roof, so that controlled natural sunlight will fill the departure hall through skylights and then filter into the arrival hall at a lower level, thus minimising the need for artificial lighting and reducing the power consumption during the operational stage.



HZMB Hong Kong Port

The entire roof of the Passenger Clearance Building is about 310 m long and 192 m wide. The roof was prefabricated in 45 major roof modules and 36 infill modules. While this prefabrication method is common in bridge construction, it is rare in roof construction. Moreover, unlike ordinary prefabricated modules, the roof modules incorporated, in addition to the structural steel frame, pre-installed building services works, architectural builder works and finishes such as aluminium claddings, skylights, smoke vents, baffle ceilings, drainage and lighting system. Most works were completed at the fabrication yard in Mainland China before it was transported to the site using marine barges.

Roof of Passenger Clearance Building

In comparison to the traditional in-situ fabrication method, adopting off-site prefabrication technique can achieve sustainability objectives by reducing wastage of materials and the use of temporary works which helps control the cost, progress, quality and efficiency. At the same time, off-site prefabrication reduces not only the exhaust gas emission arising from the less use of transportation of construction materials, but also the time of on-site operation, thus addressing the environmental concerns like minimization of noise, air and water pollution. Overall speaking, it helps promote green construction.

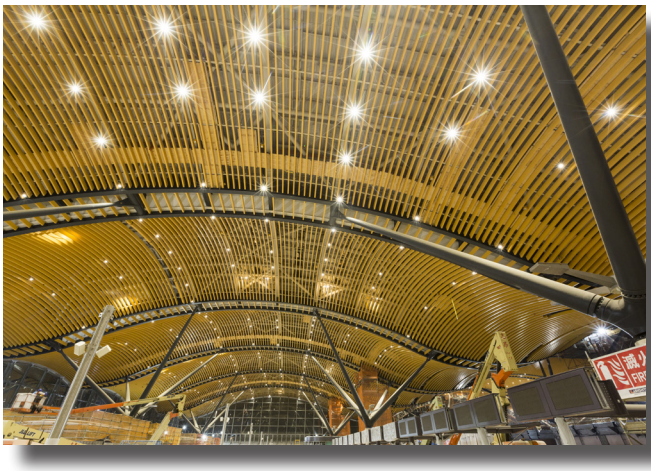
Fabrication yard for roof modules in Shaoxing

Assembly of roof modules in Zhongshan

First roof module being lifted in place

First roof module arrived Hong Kong

Skylights at roof (internal view)



Roof with lightings (internal view)

Central Kowloon Route (CKR) - Green Transport Infrastructure

CKR is a 4.7 km long dual 3-lane trunk road in Central Kowloon linking Yau Ma Tei Interchange in West Kowloon with the Kai Tak Interchange in East Kowloon. CKR together with the proposed Trunk Road T2 in Kai Tak Development area and Tseung Kwan O – Lam Tin Tunnel will form Route 6 with a total length of about 12.5 km that directly link up West Kowloon and Tseung Kwan O. The layout plan and longitudinal section of CKR is shown in Figure 1.

Figure 1 – Layout plan and longitudinal section of CKR

Upon commissioning of CKR, it is estimated that the journey time between Yau Ma Tei and Kowloon Bay during peak hours would just take around 5 minutes, saving about 25 minutes in comparison with the journey time without CKR.

The Finance Committee of Legislative Council has approved the funding application of "Central Kowloon Route - Main Works" at an estimated cost of HK$42,363.9 million on 20 October 2017. CKR has commenced in December 2017 with target commissioning in 2025.

Environmental Measures

Contrary to common belief that roads are polluting, CKR is indeed conducive to environment. With CKR operating mostly in tunnel through the Central Kowloon, the traffic diverted from the ground level roads to CKR will no longer contribute to traffic noise and roadside exhaust in the area. CKR will also bring about relief of traffic congestion and hence will help reduce annual emission of some 20,000 tonnes of carbon dioxide, equivalent to that absorbed by 860,000 new trees per year (covering an area of over 160 numbers of Kowloon Park), 18 tonnes of nitrogen oxides and 2 tonnes of respirable suspended particulates after the commissioning of the CKR.

Air Quality Improvement

Vehicular emission inside CKR tunnel will be discharged to atmosphere via the three ventilation buildings, i.e. West Ventilation Building located in Yau Ma Tei, Central Ventilation Building in Ho Man Tin and East Ventilation Building in Kai Tak, which are sited away from residential buildings as far as practicable as shown in Figure 1**.** The tunnel ventilation system is designed with an objective to remove vehicle emissions to achieve the air quality standards specified in the Environmental Protection Department (EPD)'s "Practice Note on Control of Air Pollution in Vehicle Tunnels".

Air purification systems will be adopted to remove the pollutant concentrations before releasing to atmosphere via the three ventilation buildings. The proposed air purification systems will comprise two main processes: the use of Electro-static Precipitators to remove the particulates and the nitrogen dioxide removal system, either with specially prepared activated carbon filter media or decomposing modules which are periodically regenerated on site by "washing" with chemical solutions. Each ventilation building will be equipped with the proposed air purification system that will effectively remove at least 80% of nitrogen dioxide and particulates. Figure 2 shows the schematic layout of the air purification system.

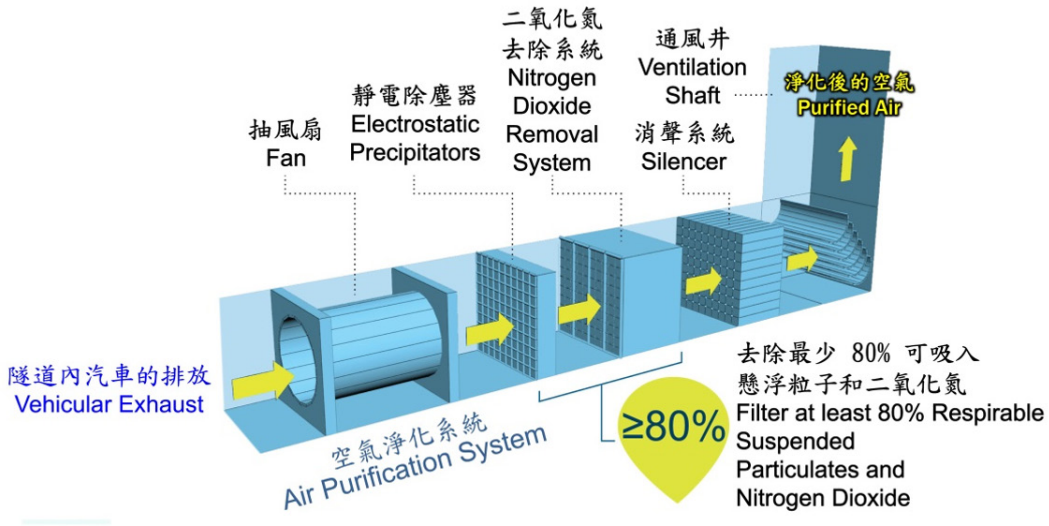


Figure 2 – Schematic layout of air purification system

Noise Mitigation

To mitigate road traffic noise impact of CKR at its both ends, permanent noise mitigation facilities including landscaped deckings of roads of about 350 metres, noise barriers of about 1,705 metres and noise enclosures of about 1,140 metres will be installed as recommended in the Environmental Impact Assessment report for CKR project as shown in Figure 3. With the provision of such noise mitigation facilities, there will be a reduction in noise level at the noise sensitive receivers at Yau Ma Tei by up to 10dB(A) and an average of 3dB(A) as compared to the noise level without CKR. Approximately 1,600 existing dwellings and 85 existing classrooms will be benefited from the Project.

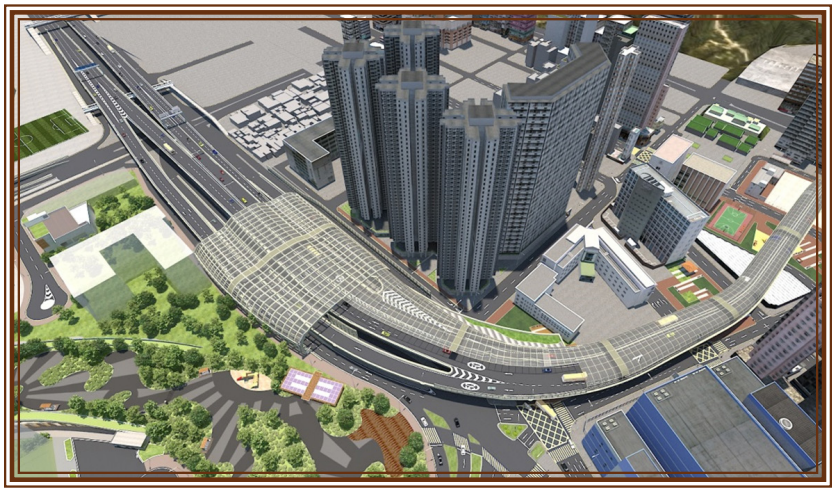


Figure 3 – Noise mitigation measures at Yau Ma Tei

Preservation of Built Heritage

The existing Yau Ma Tei Police Station (with Old Wing and New Wing built in 1923 and 1957 respectively) as shown in Figure 4 has been classified as a Grade II historic building. Through the public engagement activities, there is a general consensus that the Yau Ma Tei Police Station should be preserved as far as practical. Hence, the alignment of CKR at the concerned section is refined to avoid the Old Wing of the Police Station and the residential buildings at the south side of Kansu Street completely, while the New Wing, which CKR will pass underneath, could be preserved with the underpinning works in place.

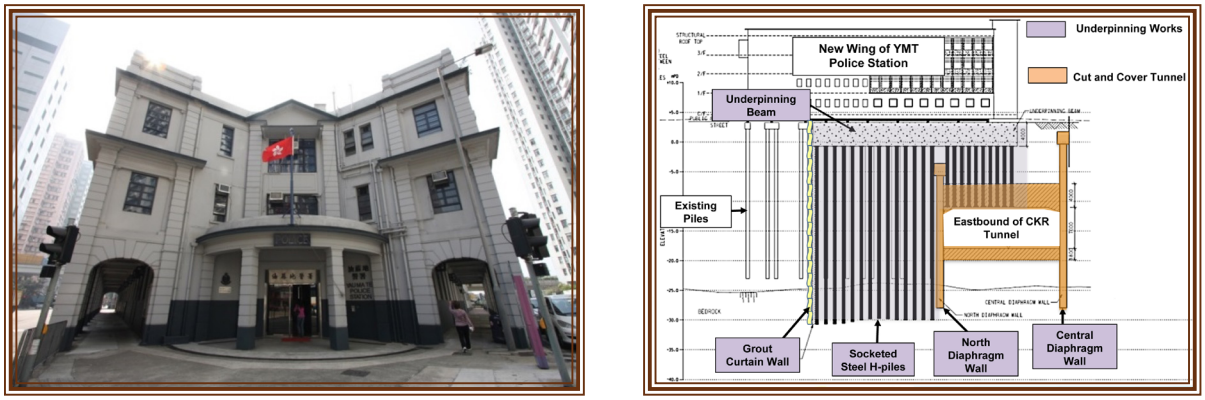


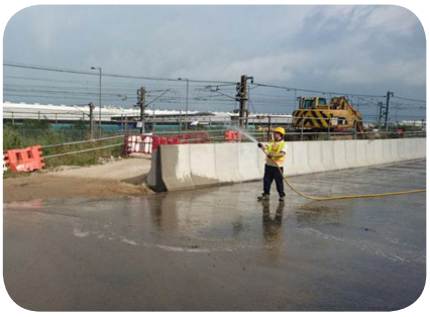
Figure 4 – Underpinning of the New Wing of Yau Ma Tei Police Station

Environmental Mitigation Measures (Construction Phase)

For the construction phase, the mitigation measures mainly include adoption of quieter equipment, movable temporary noise barriers and noise insulation materials to minimize construction noise impact; regular water spraying for dust control; control of dredging and filling rates for marine construction with deployment of silt curtains to minimize water quality impact.

Typical Environmental Measures Taken on Construction Sites

Air Quality Control



Spray water regularly on haul road to suppress dust

Carry out hydroseeding to exposed slope to suppress dust

Cover exposed surface to control dust

Noise Mitigation

Use silent machine to reduce noise impact

Cover plant with tarpaulin for noise mitigation control

Adopt acoustic barrier to reduce the noise emission

Water Pollution Control

Implement water quality monitoring

Deploy silt curtains during marine works

Use wastewater treatment facilities to treat wastewater before discharge

Waste Management

Recycle and reuse material

Adopt recycling bins

Site Cleanliness

Prevent mosquito breeding near site

Implement good housekeeping on site

Sustainable Measures

Install LED lighting with solar and wind energies for energy saving

Adopt environmentally friendly equipment (solar energy)

Development of Environmentally Friendly Railway System

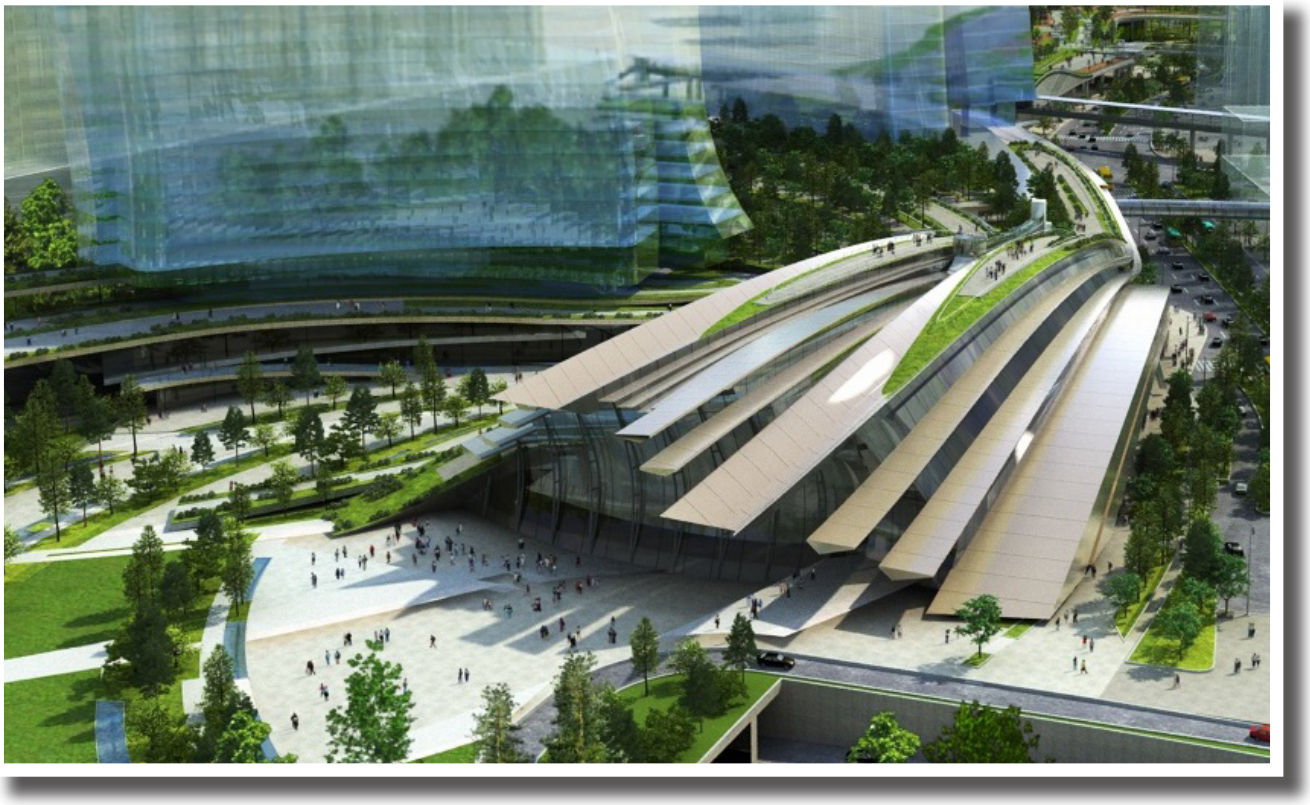
Railway is a safe, efficient and environmentally friendly mass public transportation carrier. The Government policy places emphasis on railway development as the backbone of public transport. HyD adheres to this policy and aims at planning and implementing the railway system to world-class standard.

Environmentally Friendly Measures for Hong Kong section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

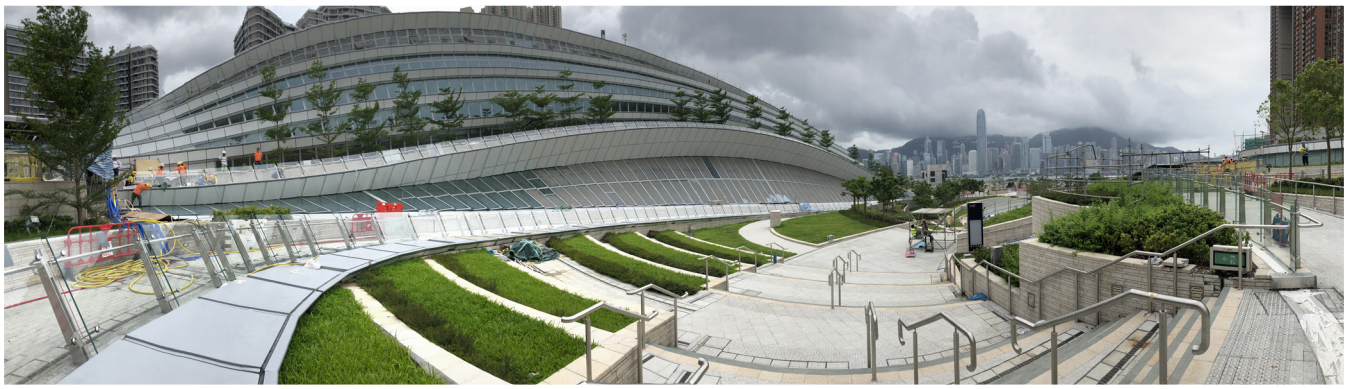
The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) is the first high-speed rail in Hong Kong, with a running length of 26 km. It will connect Hong Kong with the national high-speed rail network and allows passengers to travel between Hong Kong and Mainland cities swiftly and conveniently. The XRL runs in a dedicated underground rail corridor. The underground design helps relieve various environmental impacts, and minimizes land resumption and impact to road traffic.

Situated in the centre of Kowloon, the West Kowloon Station of the XRL is well served by comprehensive transport facilities. With innovative green design, most facilities of the West Kowloon Station are put underground in order to free up the ground level for a green plaza. Six hectares of green open space is formed to create an "urban oasis" for the public.

Besides, part of roads connecting to the West Kowloon Station has been designed to be underground which not only reduces traffic noise, but also provides more space at ground level for greening and leisure purposes.



Photomontage of West Kowloon Station



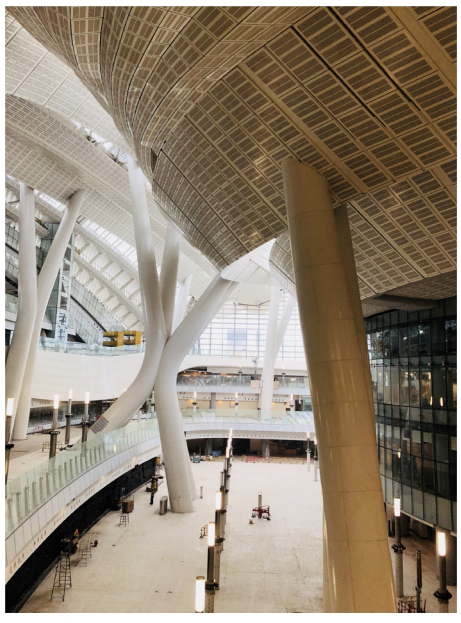
West Kowloon Station

The design of the West Kowloon Station adopts the principles of environmental protection and energy-efficiency. The roof and the façade of the station are made of high performance double skin low-e glazing, which can effectively introduce sunlight into the atrium and minimize the amount of solar heat. To support the huge-span of the roof of West Kowloon Station, a few gigantic and artistic pillars, instead of a large number of traditional columns, were used. This design not only increases the spaciousness of the atrium, but also enables better use of natural daylight for illuminating the lower level floors of the station. Passengers in the atrium can enjoy the spectacular views of the Victoria Harbour through the south façade.

As another environmentally friendly design, energy-efficient lightings were used in the West Kowloon Station. Further, all lightings, air-conditioning and escalators have been installed with sensor control that can make adjustments according to passenger flow. The design of West Kowloon Station also embraced the concept of recycling. Rainwater collected at the station would be reused after treatment. Seawater cooling plants have been used for the air-conditioning system in order to achieve energy saving.

The XRL was commissioned in September 2018. While travelling by high-speed trains from West Kowloon Station to cities along the national high-speed rail network has been made possible since the commissioning of the XRL. West Kowloon Station is also a place for people to spend their leisure time.

General view of West Kowloon Station



Natural lighting of West Kowloon Station

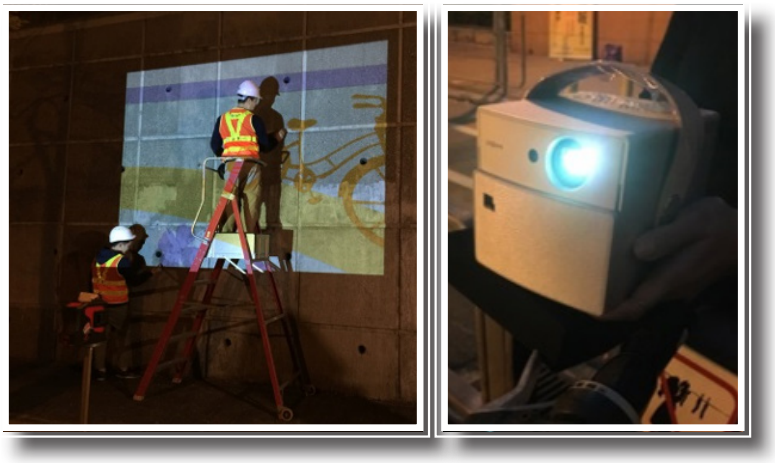
Special Thematic Design to Highway Structures

Background and Objectives

Living in a fast pace and busy concrete jungle like Hong Kong, we may not have the leisure in appreciating the beauty of nature and other good things around us. It is under such background that HyD brings an artistic touch under the theme of "Appreciate. Life. Colours" to some existing highway structures in areas with high pedestrian flow. Inspired by elements found in nature and our daily life, the design resembles delightful scenes such as walking dog in the woods, watching wild birds with family in the countryside, and captivating childhood memory of visiting an aquarium for the first time. All these happy scenes in the memories of you and me help slow down the pace and brighten up our mood.

Implementation

After developing a site specific mural design to blend in with the originally bulky structures to its surrounding streetscapes with an artistic touch, HyD's professionals of different disciplines worked closely together to identify and overcome all sorts of constraints and challenges encountered during design and implementation. Up to now, we have already completed the special thematic design to 8 highway structures.



Examples of Special Thematic Design Works Completed

"Country Delight, Fanling" - Footbridge at Luen Wo Hui near Luen On Street

The footbridge is located in the busy Luen Wo Hui area of Fanling. The theme "Country Delight" is adopted for the works which utilise the large wall surfaces of the ramps and staircases as the canvas to bring in the renowned natural beauty of the North District's countryside to the urban hub at Luen Wo Hui.

A highlight of the design is the mural painting of the famous A Chau at Luk Keng, a small island in the Sha Tau Kok Sea, which is one of the major habitats of local egrets. Combining with the autumn leaves of the native Sweet Gum tree, the magnificent picture makes one feel like being right in the middle of the countryside. Another mural painting illustrates an oversized tomato trellis, which reminds us of the fresh and juicy produces of the local organic farms in the North District. Some parts of the art work are extended to the ceiling, so you may feel like walking inside the paintings.

"Leisure in Greenery, Shau Kei Wan" - Island Eastern Corridor section near Tung Hei Road

There is a specially located park underneath the flyover, and the park is surrounded by the carriageways. As the space is sheltered from rain and sun, the special thematic design aims to revitalise and uplift the space in order to attract more people to enjoy it. The design is inspired by the natural woodland. Columns of the flyover, which resemble the form of picture scrolls, are pictured as imaginary trees, with imaginary butterflies and birds flying around.

Near the pet corner of the park, different images of dogs are painted on the columns. Some lay leisurely on the ground, while some are chasing butterflies. The images record the lively moment of our city. The design also makes use of the bridge structure to reinforce the canopy and branches of the huge trees.

"From Land to Sea, Sham Shui Po" - Subways between Apliu Street and Fuk Wa Street

Sham Shui Po is well-known for its compact urban fabric and busy streets and perhaps only a few locals could recall its historical setting before urbanization. In fact, the location of existing subways was once a coastal area before reclamation. The creative idea of turning these subways into an aquarium setting is inspired by the translucent covers at both ends of these subways. The Chinese meaning of "Sham Shui" is "deep water". The special thematic design aims to take city dwellers away from busy daily life and bring them in an imaginary "sea world".

By the design theme "From Land to Sea", gradual changes of the coastal habitats are visualized by different groups of graphic when walking through the subways. The transparent covers signify live in the coastal mangrove area with graphic of Black-faced Spoonbill or Ardea garzetta. Graphic of Green Sea Turtle or Chinese White Dolphins that live in "deeper" waters can be found when walking through basement level of the subways. In between the "Mangrove" and "Deep Sea" habitats, wildlife species living in the "intertidal mudflat" such as Fiddler Crabs and Mudskippers can be found.

Information

More information on the 8 completed special thematic design to highway structures is available from the designated webpage on HyD's website (http://www.hyd.gov.hk/en/district_and_maintenance/landscape/beautification_index.html), which can be easily accessed through browsing the internet or simply scanning the QR code as displayed at the relevant highway structures.

Photos of other completed special thematic design work

Green Office Management

Resources Saving: Water, Paper and Waste Recycling

In support of the Government's drive to save natural resources, we are committed to making every endeavour to make our green office management a greater success. In addition to energy saving as mentioned in the previous chapter titled Clean Air Charter, we have been making our best efforts to save other resources.

Water Saving

To maximise water conservation, we have adopted the use of dual-flush toilets, automatic low flow water taps and sensor type urinals. These components can effectively control the duration of water flow and keep the water flow at low level.

Waste Recycling

We treasure waste with recycle value by taking the following measures over the years:

- put up green boxes to collect reusable envelopes and papers;
- collect computer printer toners and ink cartridges for refilling and recycling; and
- put up recycling boxes to collect used paper, CDs, plastic bottles, aluminium cans and rechargeable batteries for recycling.

Paper Saving

To align with the green office initiative, we would continue with the following measures on paper saving:

- minimise photocopying paper consumption;
- use both sides of paper for printing and photocopying;
- use the blank side of used paper for drafting/ photocopying for internal document/ correspondence/fax document;
- use electronic means extensively for communication (for instance, use electronic files and keep the use of hard copies to the minimum);
- reuse envelopes and file covers;
- encourage the use of recycled paper; and
- exclude leader page for outgoing fax document.

In 2017, we consumed 17,422 reams of paper (representing the same as in 2016) of which 100% were recycled paper.

Auditing: Environmental and Carbon

Annual Environmental Audit

We conduct annual environmental audits in all 19 offices located in different premises with a view to maintaining the impetus of green measures in housekeeping. The objectives of conducting annual environmental audits are:

- to assess compliance with the green housekeeping guidelines;
- to identify non-compliance and recommend remedial actions;
- to promote good environmental management; and
- to increase staff awareness of green management and occupational safety and health initiatives.

Our offices have continued to comply with the green housekeeping guidelines. We have also taken the opportunity to share among the offices the green management best practices.

Carbon Audit

Carbon audit was conducted for Ho Man Tin Government Offices by the Building Management Office in 2017 to monitor the effectiveness of Greenhouse Gas Emission reduction effort. The relevant data are being studied by the Building Management Office.