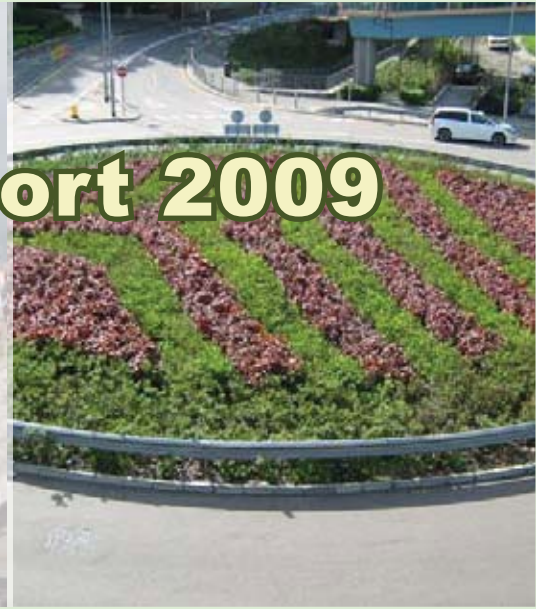


Environmental Report 2009



**Highways
Department**

同心展關懷

caring **organisation**

Awarded by The Hong Kong Council of Social Service
香港社會服務聯會頒發

2009/10

Contents

Director’s Message	1
Introduction	2
About this Report	
About Highways Department	
Environmental Goal	
Environmental Policy	
Clean Air and Blue Sky	4
Energy Consumption in 2009	
Enhancing Energy Efficiency	
Controlling Air Pollution	
Indoor Air Quality Certification and Other Green Office Measures	
Sustainable and Green Asset Management	10
Use of Reclaimed Asphalt Pavement for Road Maintenance	
Promulgation of a New Set of Guidelines for Greening Works along Highways	
Progress on Trials of Vertical Greening on Highway Structures	
Open International Ideas Competition for Noise Barrier/Enclosure Design	
Design of Noise Barrier and its Greening	
Reducing Lighting Trespass from Street Lights	
Streetscape Beautification Works for Hong Kong East Asian Games 2009	
Pedestrian Schemes for Causeway Bay Phase I	
Community Planting	
Research and Technology	20
Low Noise Road Surfacing (LNRS)	
Recycled Materials	
Thermal Patcher	
Common Utility Enclosure (CUE)	
Development of the Excavation Permit Management System (XPMS)	
Projects’ Highlights on Environmental Management	24
Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)	
West Island Line (WIL)	
Hong Kong – Zhuhai – Macao Bridge Related Projects	
Central-Wan Chai Bypass and Island Eastern Corridor Link (CWB & IECL)	
Environmental Training and Awards	34
Environmental Training	
Environmental Awards	
Achievement of Environmental Objectives and Targets and Environmental Targets for 2010	38

Director's Message



It is my pleasure to present to you our seventh Environmental Report which summarises the efforts we have taken to achieve our environmental goal in 2009, and our environmental targets and initiatives for 2010.

To support the clean air and blue sky initiatives, we endeavoured in energy saving in every aspect of our work. In our offices, we continued to implement the energy management opportunities identified in our first energy audit and take effective measures promptly. For public lighting, we achieved good result in energy saving by implementing various measures such as replacement of ballasts and retrofitting of fluorescent lights. In addition, we also started to adopt renewable energy technologies in our capital works projects. For instance, we installed photovoltaic power system and wind turbine system at our site office.

With the experience gained from the Olympic and Paralympic Equestrian Events in 2008, we devoted much of our efforts in enhancing the greening of streetscape and highway structures. During the time of the 2009 East Asian Games, large scale streetscape beautification and enhancement works were carried out to create a welcoming and festive as well as environmentally friendly atmosphere for the visitors. Besides, to enhance the aesthetic design of our noise barriers / enclosure, we co-organised the Open International Ideas Competition for Noise Barrier / Enclosure Design with other professional institutions with a view to securing world-class concepts for our future road projects.

As before, we pursued actively in research studies on environmentally friendly technology. We further developed the use of low noise road surfacing, incorporation of recycled materials in construction works, adoption of thermal patcher for road maintenance and improvement in information technology.

In 2009, we have accelerated the implementation of various capital works projects. We would use the Hong Kong-Shenzhen-Zhuhai Corridor and the Hong Kong section of Guangzhou-Shenzhen-Hong Kong Express Rail Link to demonstrate our experience on environmental management in capital works projects. You will see that we have strategically planned every stage of our projects with due consideration on environmental aspects.

With the concerted efforts of my colleagues, we will continue carrying out our business in an environmentally responsible manner. We will also strive for every opportunity to make our environment a better one, and a lovely one. I hope you will find this report interesting.

A handwritten signature in black ink, appearing to read 'Wai Chi-sing'.

WAI Chi-sing
Director of Highways
June 2010

About this Report

This report covers the period from 1 January to 31 December 2009. It shows the environmental awareness of our work; our initiatives contributing to clean air and blue sky; and efforts in environmental management of capital works projects, sustainable and green asset management, and research and technology. Our environmental awards, achievement of environmental objectives and targets for 2009, and environmental targets for 2010 are also covered in this report.

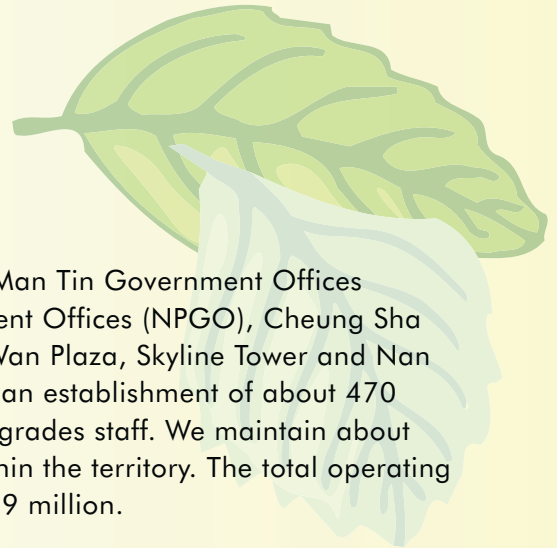
To reduce paper consumption, this report is published in CD-Rom format and uploaded to our web site.

About Highways Department

The Highways Department is responsible for:

- implementation of highway projects in the Public Works Programme;
- maintenance of public roads, including road furniture, road drainage and roadside slopes, and co-ordination and control of utility openings on public roads;
- planning, monitoring and coordinating various activities associated with implementation of new railway projects;
- providing design input for road lighting, highway structures, roadside slope upgrading and landscape features associated with capital works projects and maintenance works;
- inspecting the safety provision on highway construction sites;
- researching into new materials, techniques and standards; and
- providing engineering, quantity surveying and landscaping technical services.





The Department's Headquarters are located in Ho Man Tin Government Offices (HTMGO), with sub-offices in North Point Government Offices (NPGO), Cheung Sha Wan Government Offices (CSWGO), Cheung Sha Wan Plaza, Skyline Tower and Nan Fung Commercial Centre in Kowloon Bay. We have an establishment of about 470 professional staff and 1,610 technical and general grades staff. We maintain about 2,046 km of roads and 12,700 roadside slopes within the territory. The total operating expenditure for the financial year 2009/10 is \$2,189 million.

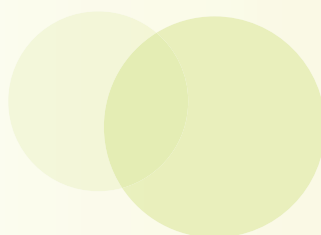
Environmental Goal

Our environmental goal is to accomplish public works efficiently and with due regard to the environment.

Environmental Policy

The Department implements an Environmental Management System certified to ISO 14001 standard. Our policy on protection of the environment has been integrated into the Management Policy with its latest version promulgated in April 2009. We incorporate environmental considerations at all stages of our work in developing and up-keeping the road network as well as planning and implementing the railway system. We act on the policy by:

- sustainable construction with due consideration to balancing environmental, social and economic needs;
- identifying and controlling the environmental aspects at all stages of our work;
- using resources efficiently, minimising waste and preventing pollution as far as practicable;
- monitoring the performance of our contractors to prevent or mitigate potential environmental impacts arising from our projects;
- complying with relevant legal and other requirements; and
- identifying opportunities for continual improvement.



Clean Air and Blue Sky

To support the clean air and blue sky initiatives, we are committed to enhancing energy efficiency, and abating air pollution in every aspect of our works.



Energy Consumption in 2009

Energy consumption for public lighting

The public lighting electricity consumption in 2009 was 134,564,004 kWh, the corresponding indirect emission was 257,017 kg of sulphur dioxide (SO₂), 156,094 kg of nitrogen oxides (NO_x) and 8,074 kg of respirable suspended particulates (RSP). Though there was a growth in the public lighting population, we achieved a saving of 1.8% in public lighting electricity consumption in 2009 as compared with 2008.

Energy consumption in offices

Separate metres were installed in different floors of HMTGO in mid 2008. The total energy consumption of our office in HMTGO for the period from January to December 2009 was 5,096,466 kWh. The corresponding indirect gas emissions were 9,734 kg of SO₂, 5,912 kg of NO_x and 306 kg of RSP.

Enhancing Energy Efficiency

Energy Saving for Public Lighting

We continued the implementation of energy saving measures on the public lighting system in 2009. With the success achieved from the lamps and lanterns replacement in 2008, we further replaced 3,000 nos. of electromagnetic ballasts to dimmable electronic ballasts in public road lights in 2009. This replacement exercise achieved an annual saving of about 500,000 kWh on electricity consumption. In 2010, we will continue our effort by further replacing 3,000 nos. of electromagnetic ballasts by electronic ballasts for public road lights.

We conducted a review on the existing lighting levels of all footbridges and identified rooms for energy saving through optimisation of the lighting level by using dimmable electronic ballasts. We completed the installation of dimmable electronic ballasts for ten footbridges in 2009 which

resulted in an annual saving of about 46,000 kWh electricity consumption. Other energy saving measures including operational rearrangement of light fittings, and retrofitting of T5 fluorescent lights in footbridge and subway lighting were also completed in 2009. These resulted in an annual saving of electricity consumption of about 229,000 kWh.

Trial use of non-illuminated retro-reflective traffic bollards (NRTBs) was also carried out. NRTBs do not require electricity supply but are able to be perceived by motorists during both day time and night time. Advantages of NRTBs include good serviceability and simpler in replacement which will result in substantive savings in maintenance costs as compared with conventional illuminated traffic bollards. However, NRTBs are not suitable at road junctions with turning traffic as they are found to be less conspicuous. Further trials to compare the functionalities, damage rates and life cycle costs of NRTBs were arranged in 2009 and would continue in 2010.



TMP Non-illuminated Retro-reflective Traffic Bollard



Glasdon Non-illuminated Retro-reflective Traffic Bollard

Clean Air & Blue Sky

Other initiatives in energy saving for public lighting included the evaluation of the applicability of white light source, namely CosmoPolis lamps and Ceramic Discharge Metal Halide (CDM) lamps. We installed 91 nos. of CosmoPolis lights in 2009 for trial, and this resulted in an annual saving of 8,700 kWh in electricity consumption. In 2010, we aim to complete installing 300 lighting points each of CosmoPolis lights and CDM lights with a view to lowering the lighting class (illumination level) for subsidiary roads, footpaths and rear lanes by these white lighting systems. We will then evaluate its cost effectiveness in energy saving.

While earlier laboratory tests reflected that LED luminaries were unable to compete with the conventional High Pressure Sodium (SON) lamps for general road lighting application in terms of efficacy and versatility, the technology of LED lights has been developing rapidly, especially for lower wattage installations. We installed 8 nos. of LED lights at two narrow streets at Kowloon and their performance in lamination and energy saving were considered acceptable. We will further explore the effectiveness of LED lights by installing about 100 nos. of LED street lights in 2010. Similarly, LED light tubes were also tested as replacement to conventional fluorescent lamps on two footbridges. Promising result of about 30% reduction in energy consumption was achieved. We will install about 200 nos. LED light tubes on six footbridges in 2010.

Energy saving in works projects

We have promulgated adoption of energy saving equipment in our works projects by using photovoltaic powered equipment and adopting renewable energy technology. LED lighting has also been used in flashing arrow sign equipment for Temporary Traffic Arrangement under term contract 20/HY/2004 (Maintenance of high speed roads in New Territories East and Hong Kong Island).

Adoption of renewable energy technology in the building design and construction industry is the global trend for sustainable

future. The project Reconstruction and Improvement of Tuen Mun Road – Tai Lam Section is a pilot scheme adopting renewable energy technology (i.e. the photovoltaic power system and wind turbine system). Photovoltaic power system was installed at the southern side of rooftops of the office for the Chief Resident Engineer (CRE) to optimise the exposure to sunlight. The photovoltaic power system comprises 56 nos. of 185W PV modules, generating a peak power output of 10kW. Photovoltaic power system is maintenance free and does not generate greenhouse gases or noise.



Photovoltaic power system at CRE's office

The micro wind turbine system was erected adjacent to the CRE's office facing north. By the modern wind turbines technology, the advanced rotar starts to spin at a very low wind speed at 1.5m/s. The system comprises a set of 132 nos. of "26cm geared wind turbine" and generator modules. No wastes will be produced in the electricity generation process. In accordance with the specification of the micro wind turbine system, 1kW can be achieved at the peak condition.



Micro wind turbine system at CRE's office

In addition to these renewable energy systems, a skylight system has been installed in the CRE's office for the Tuen Mun Road project, with an aim to reducing the reliance on electricity lighting. The system is a fixed roof window of 7.6m(W) x 6m(L) to light up part of CRE's office by natural light. To cater for the thermal effect caused by sunlight, double layer of transparent acrylic sheets have been installed to trap the warm air which will then be ventilated by the louvers between roof and false ceiling.



Skylight system at CRE's office

For the project Widening of Tolo Highway/ Fanling Highway between Island House Interchange and Fanling, we will continue to use equipment with energy saving labels and install and maintain solar energy system at the engineer's site accommodation.

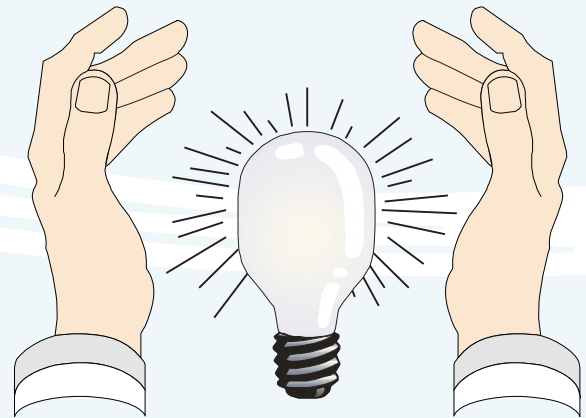


Copier for the site office shall have Energy Label under the Energy Efficiency Labelling Scheme

Energy Saving in Offices

Energy and Emission Management Team

The Energy and Emission Management (EEM) Team, set up in Highways Department in September 2007, has been providing support to the implementation of EEM programme of the department. It is responsible for the design and implementation of measures to reduce emissions and to minimise energy consumption, and for the provision of training to our staff on environmental management.



The EEM Team commissioned Electrical and Mechanical Services Department (EMSD) to conduct an energy audit in 2008. We had already implemented two of the recommendations in the energy audit. These included the installation of separate floor energy check meters to monitor the electricity consumption of our offices in HMTGO and the repair of defective false ceilings in HMTGO to minimise the loss of air conditioning.

In 2009, we continued to implement other energy management opportunities identified. By March 2009, 100 nos. of lamp were delamped on UG/F to 6/F corridors of HMTGO to reduce the illumination level. The illumination level of the public corridors had

Clean Air & Blue Sky

been lowered to a suitable level and also served the target of energy saving. Besides, 1,000 nos of T8 fluorescent lamps were replaced with T5 fluorescent lamps and 15 nos. of T8 exit signs were replaced with LED signs. Further initiative has also been explored for energy saving in our office, trial test on installation of motion detector has been carried out at a cellular office of the Headquarters. With the motion detector installed, lights will be automatically switched off when no movement is detected. We are now exploring the reliability and effectiveness of installing motion detectors in filing area and pantries.

We are aware that on-going monitoring is essential in energy saving. Because of this, energy wardens have been appointed in each office to remind colleagues to comply with the green housekeeping measures in day-to-day office operations.

Controlling Air Pollution

Reducing the emission of gas exhaust of vehicles

The department has 37 departmental vehicles. Our vehicles are sent for repair and maintenance promptly upon any breakdown or mal-functioning. Our drivers are experienced and are aware of eco-driving, and they switch off the vehicle engines while idling. We have replaced 16 vehicles with environmentally friendly engines to reduce emission of gas. To enhance environmental protection, we send our driving staff to attend Eco-driving Seminar organised by Hong

Kong Productivity Council so that they will learn the latest means and procedures of eco-driving.

Apart from government vehicles, we have specified in our contract documents that contractors should provide vehicles with "hybrid system" engines which allow the vehicles to switch between petrol and battery power automatically with equivalent performance and output to the specified petrol-driven vehicles.



Environmentally friendly contract vehicle

Reducing the use of Volatile Organic Compounds (VOC)

In our contracts involving building works, we require that the VOC content of all paint applied on the surfaces of building elements and any installations/equipment inside the semi-enclosed/enclosed areas of the building should not exceed certain threshold values. The VOC content of paint should be determined either by recognised method of calculation or laboratory testing.



Indoor Air Quality Certification and Other Green Office Measures

Indoor Air Quality Certification

The indoor air quality of HMTGO has fully complied with the Good Class of the Indoor Air Quality Objectives since 2003.

Energy Saving

- Appoint Energy Wardens in every office/division to monitor the usage of light and to keep the lumination level to acceptable minimum level.
- Review the lumination level arising from the change of room use.
- Maintain air-conditioning not lower than 25.5°C.
- Switch off lights during lunch or when staff are away for long hours.
- Switch off computer equipment and electric appliances when not in use.
- Encourage the use of staircase for inter-floor traffic.
- Use timer water taps in toilets.
- Monitor the electricity consumption of different floors by individual meters installed on each floor of HMTGO.
- Explore the effectiveness for installation of motion detector and install motion detectors in filing rooms and pantries.



Waste Collection for Recycling

- Put up green boxes to collect reusable envelopes and paper.
- Collect computer printer toners and ink cartridges for refilling and recycling.
- Put up recycling boxes to collect paper, used CD, plastic bottles and aluminium cans for recycling.

Paper Saving

- Minimise photocopying paper consumption.
- Use both sides of paper for printing and photocopying.
- Use blank side of used paper for drafting/photocopying for internal document/correspondences/fax documents.
- Use electronic means extensively for communication (for instance, use electronic files and keep the use of hard copies to minimum).
- Reuse envelopes and file covers.
- Encourage the use of recycled paper.

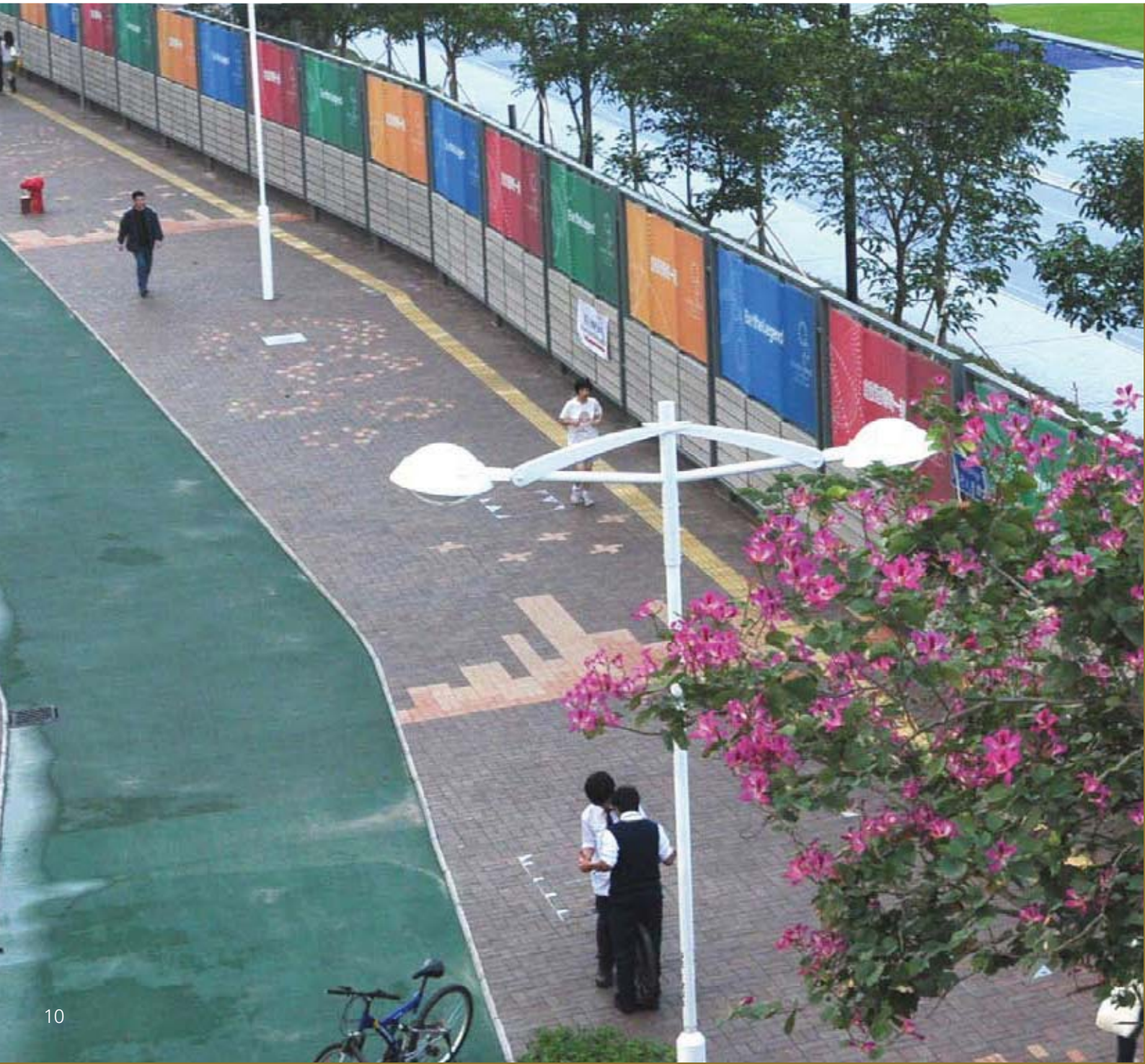
We continue promulgating the above measures on paper saving over the years. 93.96% of our paper consumed was recycled paper. The paper consumption in 2009 was 19,966 reams representing an increase of 2.5% from 2008. This increase was attributable to the accelerated implementation of rails projects and the increase in number of works contracts.

To maintain the impetus of green measures in housekeeping, we conduct annual environmental audits in all 14 offices located in different premises. 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.

Sustainable and Green Asset Management

Enables sustainable construction with due consideration to balancing environmental, social and economic needs.



Use of Reclaimed Asphalt Pavement for Road Maintenance

Highways Department constructs and maintains the public road system of Hong Kong which generates a substantial quantity of construction and demolition C&D materials every year. As a responsible and environmentally conscious department, it is our continual goal to reduce C&D materials generated from our day to day activities. A common means of waste reduction is recycling of the materials where possible.

The use of Reclaimed Asphalt Pavement (RAP) in road construction, which incorporates milled off bituminous surfacing material as part of its constituents, has been successfully adopted in many overseas countries in recent years. It involves milling of deteriorated pavement, mixing of RAP material with virgin asphalt in plant, laying, steel rolling and final rubber rolling.

To assist in reduction of waste and saving of useful materials, HyD has decided to recycle this type of surfacing material for reuse in road construction. In December 2007, about 500 square meters of Pak Tam Road in Sai Kung was reconstructed using RAP for the first time. Since 2008 three road maintenance contracts and three road construction/improvement contracts have started using RAP for pavement construction. For bituminous materials including road base, base course and wearing course, the contractor is required to use RAP in the range of 10% to 15% by mass of the total mix. The mandatory requirement of using RAP has been extended to the new road maintenance contract no. 13/HY/2009 to commence on 1 April 2010.

We intend to progressively extend the mandatory use of RAP to other contracts and also to increase the percentage of its use. In support of utilizing more re-cycled material, a research study was launched in 2009 to investigate the feasibility of increasing RAP content to 30% in bituminous materials to be applied in our road construction works without compromising quality.

Promulgation of a New Set of Guidelines for Greening Works along Highways

A new set of guidelines for greening works along highways (HQ/GN/15) was promulgated on 23rd October 2009 to advise on the requirements of greening to be provided along public roads. It facilitates project proponents and their agents to plan and design an appropriate level of greening provision for each type of road projects, taking account of landscape context in which the project is located, site constraints, design objectives, cost-effectiveness and maintenance requirements; and to supervise the proposed greening works in a proper manner during construction stage.



Roadside Planting along Deep Bay Link

A threshold percentage of greening works against the estimated contract sum was also developed based on a survey on the provision of greening works in our relevant contracts from 2001 to 2008. List of greening works for new capital works projects is recommended to meet the threshold percentage that varies for different types of works (from 0.6% to 7.45% of contract sum in average).

This set of guidelines gives recommendation for thematic design for projects with particular emphasis on the identification and design of greening nodes for special planting to enhance the roadside landscape for better integration of the project with surrounding landscape.



Green Node for Special Planting at Sham Tseng

Use of proprietary greening products may be considered in areas where traditional greening method or technique is not possible due to site constraints. It recommends small scale trial shall be conducted to evaluate their performance of these products in terms of cost effectiveness, achievement of greening effects, management and maintenance prior to full scale implementation.



Greening on Retaining Wall at Castle Peak Road (Ting Kau)



Planting on Earth Mound and Reversion of Natural Stream along Route 8

To promote greening and as part of environmental education, this set of guidelines also recommends that plant labels shall be put up in areas with pedestrians.

The appendices list documents that are essential for greening works in planning, design and construction stages for easy reference by relevant stakeholders.



Roadside Landscape Works at Penny's Bay

Progress on Trials of Vertical Greening on Highway Structures

With the completion of all trial sites (14 nos. in 2008 and 35 nos. in 2009), we have entered into the monitoring and evaluation stage for promotion of vertical greening. As it takes time for plants to establish and create the anticipated greening effects to the surface of highway structures, the performance of the vertical greening and their associated impacts are being monitored and assessed in terms of sustainability and maintenance requirement on a regular interval from the time of completion of planting works for two years. In general, the greening effect is satisfactory for the majority of the trial sites. There are however, a few trial sites where the intended greening effect has yet to be achieved as a result of site constraints and vandalism. All the trial sites are being closely monitored. Photos of vertical greening on these trial sites will also be uploaded in the Integrated Structure Information System of HyD's intranet.



Footbridge across Wetland Park Road, Tin Shui Wai (NF 383)



Tin Wan Praya Road to Tin Wan Hill Road Southern District (H186)



Gascoigne Road Flyover at Gascoigne Road near Wylie Road (K37)

Open International Ideas Competition for Noise Barrier/ Enclosure Design



The high density development in the urban area of Hong Kong often results in heavy traffic occurring adjacent to residential units thus making abatement of traffic noise is one of the major considerations in highway planning, design and construction. As such, Highways Department co-organized the Open International Ideas Competition for Noise Barrier/Enclosure Design in 2009 with Environmental Protection

Department, the Hong Kong Institute of Architects, the Hong Kong Institution of Engineers, the Hong Kong Institution of Highways and Transportation and the Hong Kong Institute of Landscape Architects with a view to securing world-class concepts for enhancing the aesthetic design of noise barriers for future road projects.

The competition was divided into Professional Group and Open Group. The Professional Group was open to all members of the professional institutes of architects, engineers, landscape architects and designers in Hong Kong, the Mainland and overseas. The Open Group was open to the general public. The competition was well-received and had attracted 109 eligible entries from Hong Kong, the Mainland and 9 other overseas countries.



Three locations (Gascoigne Road Flyover, Tuen Mun Road and Tai Po Tai Wo Road) representing typical local road settings were selected as sites for the competition.

A jury panel consisting mainly of eminent professionals adjudicated the entries according to the broad guidelines including creativity, acoustic effectiveness, buildability, harmony with adjacent environment, urban design principles, community acceptance and professional advice given by a technical committee consisting of representatives nominated by professional institutions and concerned government departments.



Officiating Guests in the Launching Ceremony



1st Prize of Professional Group (Category A)

The competition was launched in January 2009 and was successfully completed in March 2009. Following a prize presentation in April 2009, the winning entries were exhibited in popular shopping arcades and professional associations between April and September 2009.

The aesthetic quality and creativity of the participants have inspired us to search beyond the existing design framework. We will also actively explore opportunities for applying the brilliant concepts of the winning entries in our future projects so to further enhance the cityscape of Hong Kong.



1st Prize of Professional Group (Category B)

Design of Noise Barrier and its Greening

Trial green walls/noise barriers have been implemented at Tseung Kwan O Road and Tsing Tsuen Road which had achieved very satisfactory greening effect while works at Fanling Highway are under construction.



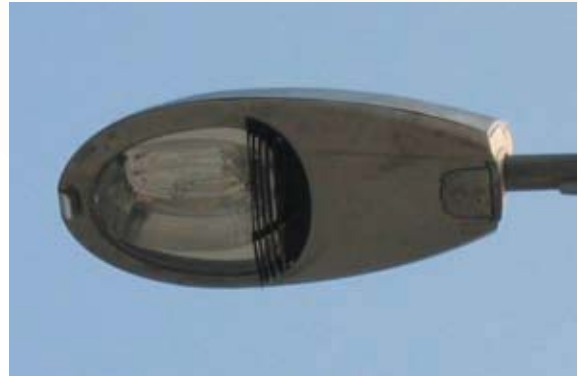
Green walls/noise barriers along Tseung Kwan O Road



Green walls/noise barriers along Tsing Tsuen Bridge at Tsuen Wan side

Reducing Lighting Trespass from Street Lights

To minimize potential nuisance due to light trespasses from some wall-mounted street lights into windows of residential buildings, a site survey was conducted in the last quarter of 2008 and reviewed that there were about 370 nos. wall-mounted lights on residential buildings close to the windows yet to be provided with light trespasses reducing features such as cut-off type lanterns / light shields. In 2009, we completed improvement measures for 300 nos. of them by replacing existing lanterns by more efficient cut-off type lanterns or installing light shields. Out of these 300 nos., we introduced the installation of louvered lanterns as an alternative measure to light shields to about 100 nos. wall-mounted lights. Improvement to the remaining 70 no. using louvers is anticipated to be completed soon.



Louvered lantern

Streetscape Beautification Works for Hong Kong East Asian Games 2009

Main Venue in Tsung Kwan O

The 5th East Asian Games (EAG) was held in Hong Kong from 5 - 13 December 2009 and it was the first time ever for the city to host a large-scale multi-sport international event. In order to enhance the street environment for this memorable event, streetscape beautification works jointly undertaken by the Urban and New Territories Regional Office, Bridges and Structures Division, Lighting Division, Survey Section and Landscape Unit were implemented to 17 competitive venues in both urban areas and the New Territories, with major emphasis on the main venue at Tsung Kwan O (TKO) Sports Ground. Our dedication and professionalism in completing the high quality streetscape enhancement works for all these 17 sites were well appreciated by the organizer of the EAG.



Tsung Kwan O Sports Ground

In order to create a welcoming and festive atmosphere for the visitors and the TKO residents, large scale streetscape beautification works were carried out in the vicinity of the Sports Ground. The works included thematic paving pattern design with HKEAG emblem plaque, beautification of 2 footbridges and 1 subway connecting the main venue with the nearby MTR stations, colour dressing of the cycle track around the stadium, repainting of street furniture, installation of special carriageway and pedestrian light fittings and associated greening works.

Beautification of Footbridges and Subway

Works were carried out at the two footbridges across Po Hong Road as they are prominent pedestrian linkages from Tsung Kwan O MTR station to the main venue. The design idea was based on HKEAG mascots "Dony" & "Ami" and their names were given to these two bridges respectively as a design theme. Oversize mascots stickers display was used to decorate the bridges and they were supplemented by stickers with the emblem, slogan and thematic colours of the EAG. This was the first time large-scale application of stickers on HyD structures. On the other side of the venue, similar application was also used to beautify both entrances and internal walls of a subway underneath the Wan Po Road leading to Hang Hau MTR station. With the enhancement works, the highway structures apart from providing pedestrian linkages to the main venue also become landmark features for the EAG along public roads. The results were very outstanding and effective and they became very popular attractions to the visitors for photos taking during the Games.

Footbridge NF337 (Dony's Bridge)



Footbridge NF442 (Ami's Bridge)

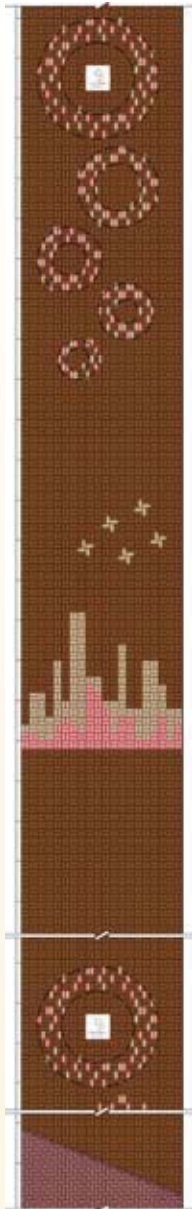


Subway NS250 (Dony's and Ami's Subway)



Thematic Paving Pattern and Pedestrian Facilities

The 2009 EAG emblem is a key symbol with the sparkling fireworks representing the energy of athletes. To bring out this message, natural granite was used to form a plaque with the emblem engraved on it. Granite was chosen in view of its durability which symbolized the determination of the athletes to achieve sporting excellence in the EAG with their best endeavours.



Thematic Firework Paving Pattern



HKEAG Emblem Plaque

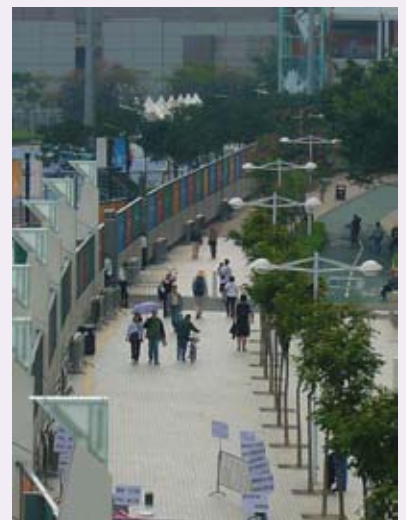
This special paving pattern aimed at mimicking the “five-rings” fireworks graphics of the EAG emblem with emblem plaque laid at the centre of the top ‘firework’ ring to signify the sparkling and exciting events of the HKEAG. To enhance the overall picturesque effect of the paving design, an abstract silhouette of Hong Kong skyline with 5 stars above a clear sky was created with an idea borrowed from the national flag. This special pattern would not only act as signpost for visitors/spectators to the main venue from the main transport nodes but also helped to spread the atmosphere of the EAG from the main venue to the connecting thoroughfare. Guided footpath with tactile was laid to cater for the need of visually-impaired and re-painting works for cycle tracks and associated street furniture were also carried out outside the main venue.

Special Street Lighting



Special Carriageway Lighting

Carriageway and pedestrian lighting also played an important role in a well co-ordinated design to create a festive atmosphere. An unique special light fitting with design feature was chosen to replace the standard lighting to draw the attention of general public and to compliment the façade of the stadium. The triangular-shaped elements symbolized “flags” along the pavement which were to echo with the EAG flag and other national flags raised in the main venue.



Special Pedestrian Lighting

Greening Works



Tree Planting

Greening works were also carried out at specific main roads leading to the stadium to enhance the quality of general streetscape, e.g. trees and shrubs planting at the central median of Tong Ming Street, Tong Chun Street, Tong Yin Street. Ornamental shrub planting was carried out at the entrances of the Dony's and Ami's Subway and at Dony's Bridge.



Ornamental Shrub Planting by Tseung Kwan O Sports Ground

Other Venues

Similar treatments where appropriate were applied to enhance the streetscape around other venues. Besides, special decorative railings and bollards were used for some venues, with design and layout agreed with Transport Department. The use of an open "O" in the centre of certain railing panels is a distinctive feature which allows mounting of specific 2009 EAG mascot plates at selected locations to reflect the type of sports held at that particular venue.

For the Queen Elizabeth Stadium and the Hong Kong Stadium, a number of decorative bollards were designed to be removable with special bollard housings. This would facilitate repeated removal and reinstallation of bollards and railings without road excavations when requested by the Police for crowd control in future.



Kwun Tong Bypass



Footway at Caroline Hill Road



Decorative railings and bollards with specific 2009 EAG mascot plates for rugby sevens and football (Hong Kong Stadium)



Pedestrian Schemes for Causeway Bay Phase I

The implementation of pedestrian schemes Phase I (section of Lockhart Road & East Point Road) was completed at the end of 2009. The streetscape design of part-time pedestrian streets at section of Lockhart Road and East Point Road was similar to adjacent design at Great George Street as shown below.



Enhanced Footpaths

The width of footway was widened to approximate 1.6m from the original footway. Also, in anticipation of busy pedestrian traffic from 4 p.m. to 12 midnight in weekdays and from 12 noon to 12 midnight in weekend and public holidays, a dropped kerb was designed with a height of 15mm in order to provide a convenient crossing for the pedestrians in particular the old and disabled. The paving design was 200x100x50mm high quality paving blocks in red color with yellow feature banding.



Roadside Greening at Lockhart Road



Footpath reconstruction works at Lockhart Road

Roadside greening, amenity lighting, tactile guide paths and associated street furniture (i.e., removable bollards) were also provided.

Community Planting

Three community planting activities, namely "Community Planting for Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha", "Community Planting for Improvement Works for Tsuen Wan Promenade" and "Community Planting for Route 8 - Stonecutters Bridge", were held in 2009. Over 200 people, including officiating guests and participants from invited schools, enjoyed the planting activities and contributed to enhancing the greening of their own district.



Community Planting for Improvement Works for Tsuen Wan Promenade on 11.7.2009



Community Planting for Improvement to Tung Chung Road on 23.5.2009



Community Planting for Route 8 - Stonecutters Bridge on 12.10.2009

Research and Technology

We continue to focus our research on environmentally friendly technology, such as further development of low noise road surfacing, incorporation of recycled material into our road pavement and street furniture, adoption of thermal patcher for road maintenance work to reduce noise pollution and common utility enclosure to reduce road opening, and improvement in information technology to enhance efficiency.



Low Noise Road Surfacing (LNRS)

Our noise measurement of the new polymer modified friction course material at Chui Tin Street continued. Following the first 24 months of noise measurement, the noise reduction performance at Chui Tin Street is being further monitored by another 24 months since October 2008. The measurement results demonstrate a substantial improvement over previous LNRS trials. The noise performance benchmarking exercise of the various types of friction courses at the Fanling Highway was completed. The monitoring results indicate that a thicker layer of the new polymer modified friction course material with a smaller nominal maximum aggregate size provides the quietest surfacing.



Taking noise measurement for LNRS at Fanling Highway

Recycled Materials

Recycled Asphalt Pavement

The amount of recycled asphalt pavement (RAP) incorporated in bituminous materials is limited to a maximum of 15% as stipulated in the General Specification 2006 edition. With a view to boosting the amount of RAP being exploited, a research study was launched in 2009 to investigate the feasibility of using a higher RAP content in bituminous materials whilst maintaining the quality of the rehabilitated pavement. The study involves a series of laboratory tests and a review on the use and production of bituminous materials with high RAP content in oversea countries. Site trials on construction of bituminous materials using a higher proportion of RAP will also be arranged to verify the site performance of the materials.



Recycled asphalt pavement milled up from existing bituminous pavement



Resurfacing works at North Lantau Expressway using recycled asphalt pavement

Recycled Fibreglass

Site trial of synthetic gully grating is in progress and the specification of this material is expected to be available in 2010. The synthetic gully grating comprises mainly recycled fibreglass and can be recycled into new ones after aging. Also, the manufacturing process of this gully grating does not cause air pollution.



Synthetic gully grating

Asphalt Rubber

Our laboratory test study on asphalt rubber indicates that the performance of bituminous materials has been improved after incorporation of asphalt rubber. Site trial on construction of stone mastic asphalt incorporated with asphalt rubber is being arranged and the condition of the pavement will be monitored to evaluate its site performance.

Recycled Aggregates as Sub-base

We have been monitoring the site performance of the sections of Fo Tan Road which used sub-base containing recycled aggregates. The performance of the trial sections of footpath and carriageway are still performing satisfactorily without signs of reflective cracking in the asphalt pavement. The long term monitoring of the asphalt pavement will continue till end of 2010.

Paving Blocks with Recycled Glass

Waste glass cullet can be used to substitute part of the aggregates in concrete paving blocks. We have laid a trial section of public footpath at Wang Kwong Road, Kowloon Bay using such paving blocks. We have been regularly monitoring their site performance. So far, we have found no difference in site performance between concrete paving blocks with recycled glass and conventional concrete paving blocks, and we have not received any adverse comment or complaint from the public about the trial site. We shall lay more pilot sections at various locations with a view to extending the use of this kind of paving blocks progressively.



Paving blocks with recycled glass at Wang Kwong Road

Subject to the policy support from Development Bureau, we shall introduce the mandatory use of concrete paving blocks with recycled glass into the specifications of our new road maintenance contracts commencing from 1 April 2011 onwards.

Thermal Patcher



Truck mounted thermal patcher

The use of thermal patcher to perform minor asphalt pavement repair works was stipulated in two maintenance contracts of Highways Department commenced in 2009. The two maintenance contractors are required to use thermal patchers in priority for carrying out permanent reinstatement works for defective bituminous surfaces with size up to 2.5 square metres. The truck-mounted plant makes use of infra-red radiation to heat up and soften the existing asphalt in a defective area. The softened asphalt mixed with some added virgin asphalt is then compacted to create a seamless reinstatement. Throughout the infra-



Thermal patcher in operation

red heating process, there is no naked flame in direct contact with the existing asphalt to avoid damaging the existing asphalt for reuse.

We are also exploring the feasibility of adopting hot-in-place recycling technique to perform larger scale asphalt pavement repair works. The old asphalt pavement is heated, mixed with rejuvenator and then compacted under the hot-in-place recycling equipment when the repair works are being carried out. The advantages of using thermal patcher include promotion in recycling of asphalt pavement, better prevention of water ingress into the pavement structure due to the seamless reinstatement, and less noise generation when compared with the conventional square patching using electric breaker in excavating the damaged asphalt pavement.

Common Utility Enclosure (CUE)

We have resolved the outstanding administration issues regarding the use of the two small scale CUEs at Horizon Drive in Chung Hom Kok and at Yan Cheung Road in West Kowloon. A power company and a telecom company are planning to lay their services within these two CUEs, which adopt a crossroad culvert type of design.

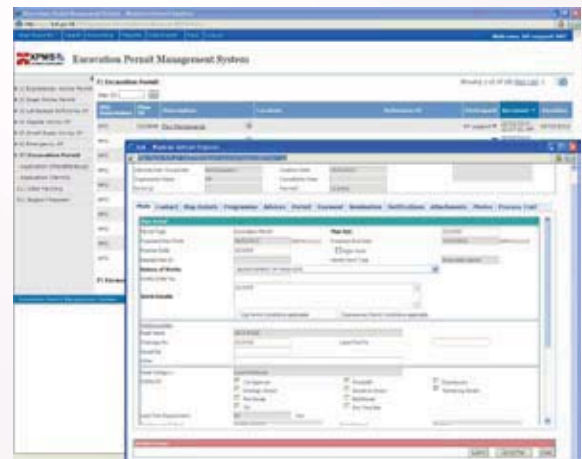


CUE at Horizon Drive

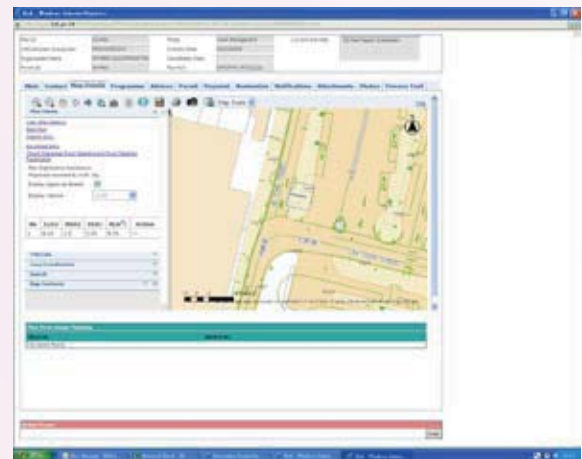
Development of the Excavation Permit Management System (XPMS)

XPMS is a new single Web-based computer system launched in August 2009, to replace the Utility Management System and its

Internet Interface. The advantages of the new computer system would include eliminating the need of data replication and maintenance of two existing separate systems; enhancing the capacity of electronic information management and submission/dissemination; and promoting electronic submissions. The efficiency and effectiveness of road opening management are therefore improved.



The XPMS brings in many major improvements in terms of user friendliness, transparency and efficiency. For example, the requirement for an application through signed paper form or by e-cert signed submission can be eliminated. Data are updated in real time and efficiency of permit processing is improved. There is no more daily downtime for system replication. Users can also keep track of the permit process easily through the process trail records. Furthermore, the Geographical Information System (GIS) features are enriched.



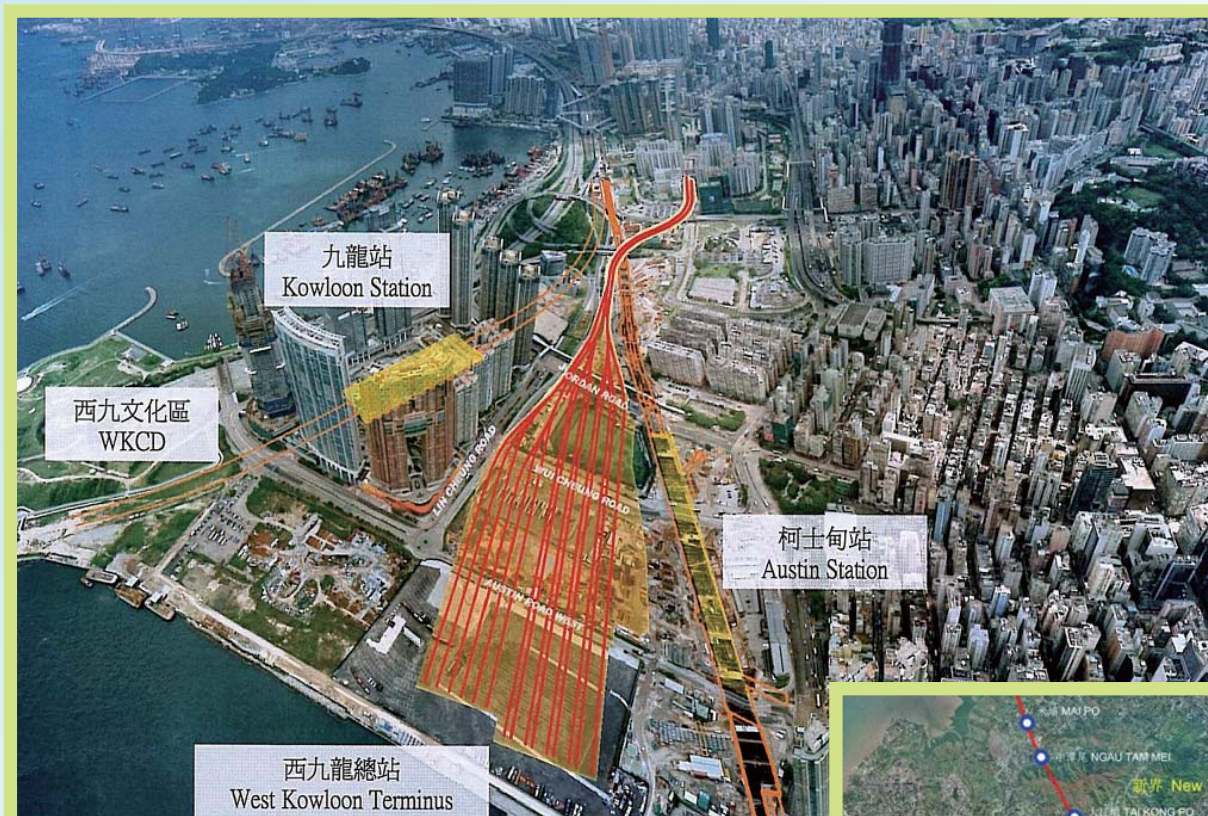
Projects' Highlights on Environmental Management

"Our management philosophy puts the environment in the front of all project activities. We systematically manage impacts that our works may have on the environment for the benefit of community."



Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

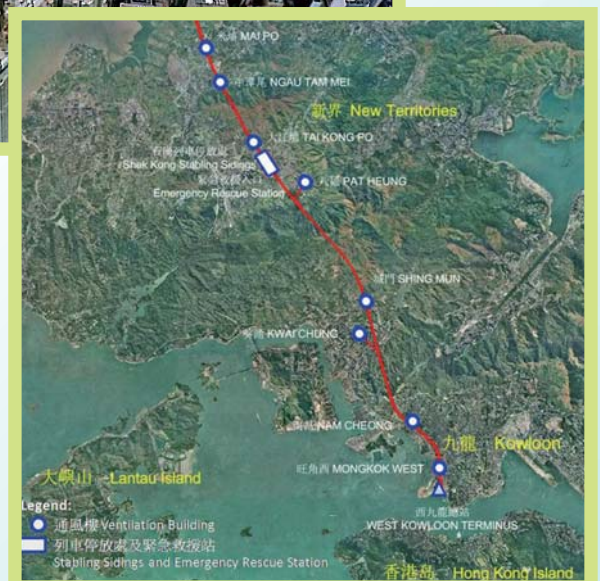
The Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) will be a 26 km long underground railway. The XRL tunnel will run from the West Kowloon Terminus (WKT), going north passing Tai Kok Tsui, Sham Shui Po, Lai Chi Kok, Kwai Chung, Tsuen Wan, Pat Heung, Kam Tin, Mai Po and the boundary at Huanggang. Major construction works of the project include the WKT and the associated road improvement works, eight ventilation buildings along the tunnel alignment, the stabling sidings (SSS) and the emergency rescue station (ERS) apart from the 26 km long tunnel. The XRL, which will allow a maximum train speed of 200 km/hr, will connect to and become a part of the 16,000 km of high speed railway network of the Mainland. The XRL will bring great convenience to the business travellers and tourists, facilitating the development of tourism and servicing industries, and benefit the whole economy of Hong Kong. Construction of the XRL has commenced in January 2010. It is anticipated that the works will be completed in 2015.



West Kowloon Terminus (WKT)

Strategic Environmental Planning

High speed railway is an environmentally friendly means of transport. Statistics indicates that the energy consumption and carbon emission of high speed railway per passenger per km are only 1/6 and 1/10 respectively of the amounts consumed and emitted by airplanes. In fact, air pollution caused by airplanes at high altitude results in more direct



Alignment of XRL

Projects' Highlights on Environmental Management

and greater damage to the atmosphere. It is also noted that the carbon emission of high-speed railway is only 1/4 of the amount emitted by buses. Since the railway tunnel will be constructed underground, its noise pollution can be minimized. Therefore, high speed railway is more environmentally friendly than other modes of transport.

As the XRL will be constructed and operated underground, the impact on the precious environmental resources such as Mai Po, Inner Deep Bay Ramsar Site, country parks, declared monument and graded historical buildings can be avoided.



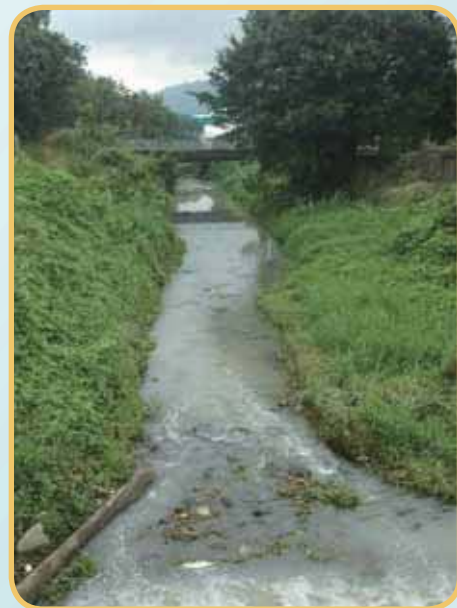
Mai Po

Environmental Impact Assessment (EIA)

Ecology

In selecting the alignment and construction method of the XRL, we have done our utmost to mitigate the impacts on the more significant ecological resources, such as Wetland Conservation Area and Country Park. Through tunneling construction, the size of work areas at ground level is minimized, and the direct ecological impact due to the project will be minimal.

To compensate for the affected stream habitat in the vicinity of the SSS at Shek Kong, these stream habitat will be re-established. The compensated stream habitat will incorporate ecologically friendly channel features, such as natural stream bed substrate and vegetated stream banks, so as to provide suitable aquatic habitats for wildlife use.



Stream at Shek Kong

Airborne Noise

To alleviate construction noise impacts, measures will be taken to minimize the use of construction plant. Works will be conducted in phases and simultaneous operation of powered mechanical equipment will be avoided as far as possible. Further mitigation measures such as quieter plant, silencer, movable noise barrier, noise insulating fabric and acoustic enclosure will be deployed to meet the construction noise criteria as per the Technical Memorandum issued under Environmental Impact Assessment Ordinance (EIAO). Works in the vicinity of schools during examination period will be avoided. Moreover, we will maintain close liaison with the concerned parties through community liaison groups.

During the operation phase, a 5.5m high barrier will mitigate the potential impact from the operation of the SSS in Shek Kong. Fixed plant noise such as those from air compressors and

chillers in SSS, tunnel ventilation and WKT will be controlled by appropriate means to avoid the allowable maximum sound power levels being exceeded, and to comply with EIAO noise criteria at noise sensitive receivers.

Cultural Heritage

Assessment of cultural heritage is an important aspect of the EIA. We have carried out on-site assessments within Government land, and the results indicate that there is no cultural heritage on these sites. Further assessment and investigation will be carried out on sites within private land before the commencement of works in areas such as the SSS in Shek Kong. If any artifacts are identified, rescue excavation will be conducted and recorded in details so as to preserve the artifacts. Other mitigations such as watching brief, site audit and minimization of works area will be adopted to minimize the potential impact on terrestrial archaeology. Moreover, historical buildings such as the ex-Lai Chi Kok Hospital will be closely monitored so as to avoid impacts on the structures due to the tunneling works.



ex-Lai Chi Kok Hospital

Waste Management

Measures to minimize waste generation were considered in the preliminary design of the terminus, tunnels and ventilation buildings. The total volume of construction waste generated from the project is estimated to be about 10 million m³. In order to reduce the volume of waste generation, we will re-use about 700,000 m³ excavated materials as fill in the XRL project as far as possible. Part of the surplus materials, estimated at about 3,300,000 m³ at present, will be transported off-site for beneficial use in other possible projects, such as the man-made island of the Hong Kong-Zuhai-Macao Bridge, Central Wanchai Bypass and concrete batching plant. We will continuously and proactively liaise with other departments to re-use the surplus materials. The remaining surplus materials will be transported to the public fill reception facilities in Hong Kong and Tai Shan in China as the last resort.

West Island Line (WIL)

Construction of West Island Line commenced in July 2009. To minimise impacts that construction works may have on the environment, due consideration was given to implementation of various environmentally friendly construction methods such as tree protection, noise mitigation, dust control, waste water management and waste management. In particular, we placed great importance in engaging the public in discussions such that their concerns about the effect of railway facilities to the communities are either resolved or minimised.

Environmental Considerations in Construction

Tree Protection

Mass Transit Railway Corporation Limited (MTRCL) and contractors employed certified arborists to supervise the tree protection work. Trees within the works site were properly protected from construction activities. Rare species were transplanted with special care.



Protected species - Hong Kong Pavetta (*Pavetta hongkongensis*) - was protected on site; then was transplanted to a suitable location with similar habitat

Trees of conservation importance - Silver-back Artocarpus (*Artocarpus hypargyreus*) - are fenced off



With supervision of the Certified Arborist, trees are properly protected on site from construction activities



Noise mitigation

Construction noise control measures have been incorporated into the construction method design, such as use of quieter construction equipment, movable and temporary noise barriers. With these measures in place and concerted efforts with our counterparts in MTRCL, we are able to complete the project with minimal disruption to the public.



Acoustic Enclosure is under preparation for tunnel works at the magazine site

Dust control

We encouraged contractors to adopt good site practices such as paving haul road, regular watering to suppress the dust and covering stockpile etc.



Construction site dust control measures



Waste water management

Good site management and housekeeping practices were in place to prevent any construction wastes and other construction-related materials from entering the public drainage system and coastal waters. Sewage arising from the construction works site was treated before being discharged.



U-channel to collect surface runoff



Sump-pit for de-silting



Waste water treatment system

Waste management

Waste types generated by the construction activities include construction and demolition materials (e.g. from site clearance, excavation and tunnelling works), general refuse, and chemical waste from the maintenance of construction plant and equipment. These wastes were handled, transported and disposed of in accordance with Government guidelines and good site practices.



Chemical containers properly stored and fenced off



Chemical waste properly stored



Chemical spill kit



Waste storage area



Stored C&D wastes

Community engagement

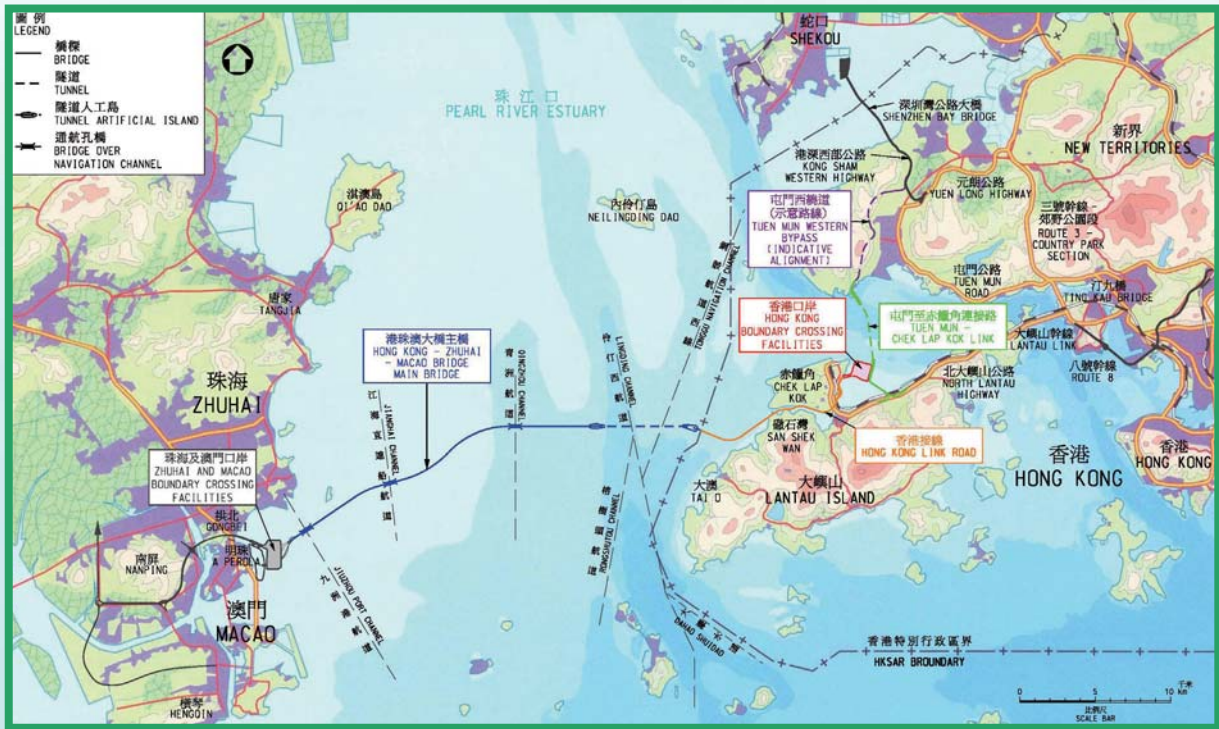
To maintain close contact with the community, community liaison groups for the Sai Ying Pun, the Hong Kong University and the Kennedy Town sections respectively have been set up to meet the locals quarterly and to keep them informed of the progress of the WIL project. MTRCL distributed the WIL newsletters reporting on the key public concern issues including the potential environmental impact arising from the construction phase of the project. A designated hotline has also been set up to answer public enquiries about the WIL project.



Community Liaison Group

Hong Kong – Zhuhai – Macao Bridge Related Projects

The Hong Kong – Zhuhai – Macao Bridge (HZMB) is an unprecedented important strategic road corridor which links up three regions viz Hong Kong, Zhuhai and Macao in the Pearl River Delta of China. It provides opportunities for significant social and economic development in these areas for coming decades. The HZMB related projects within Hong Kong include the Hong Kong Link Road (HKLR), Hong Kong Boundary Crossing Facilities (HKBCF) and the Tuen Mun - Chek Lap Kok Link (TM-CLKL). It is envisaged that the HZMB related projects will start construction within similar timeframe in 2011 for completion in 2016.



Environmental Impact Assessment

Robust environmental impact assessments (EIA) were completed to evaluate possible cumulative environmental impacts of the projects during the construction and operational phases. Our prime aim, which we have substantially achieved, is to ensure that the projects meet the requirements under the Environmental Impact Assessment Ordinance in all aspects including those on air quality, noise, water quality, ecology, Chinese White Dolphin and visual etc. Findings of the EIA indicate that the impact will be minimal, since the proposed HKBCF will be at least 2 km afar from the existing Tung Chung residents – roughly the distance between Jordan and Central; and the proposed HKLR will be at least 700m away. The Environmental Protection Department approved the EIA reports of the projects in October 2009 and issued the Environmental Permit in November 2009.

During our consultation with the public in particular the green groups, one of their main concerns is whether the proposed projects would cause adverse impacts to the dolphin habitats around the Lantau area. The public's concern is certainly also our concern.

Dolphin Conservation Key

The government attaches great importance to preserving the dolphin ecology when planning the projects. Our aim is to minimise any impact on these mammals. As such, our EIA has thoroughly assessed the potential impact on the Chinese White Dolphins' habitat.



To grip the precise pattern of dolphin activities in Hong Kong waters, we have engaged dolphin expert to conduct an in-depth study. The study indicates that dolphins occur year-round at Sha Chau/Lung Kwu Chau, Tai O and near the west waters of the Airport Island, while their occurrences near the northeast waters of the Airport Island and the Brothers Islands are seasonal. The

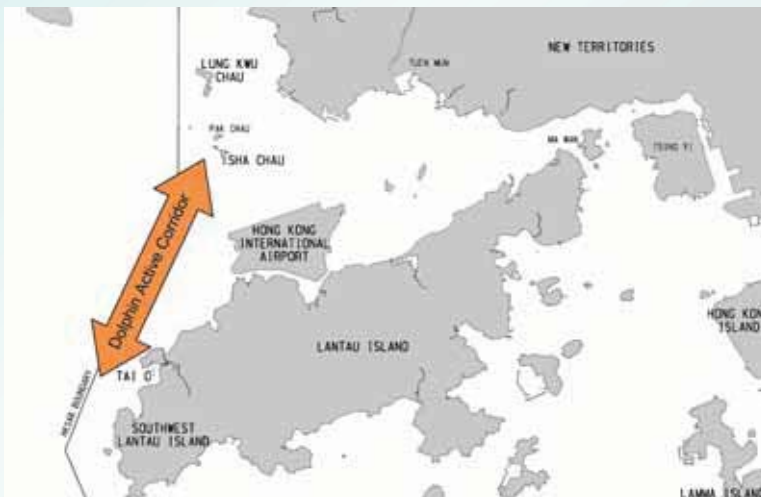
Projects' Highlights on Environmental Management

overall densities, densities of calves, sighting densities of feeding and socializing activities are considerably higher near the west waters of the Airport Island. Moreover, the waters west of the Airport Island is a more important traveling corridor for dolphins in Hong Kong – between Sha Chau/Lung Kwu Chau and Tai O. Accordingly, we put the HKBCF at northeast of the Airport so as to putting human activities further away from the active nursing ground of dolphins around the west waters.

To further protect our dolphins, we have formulated specific mitigation measures to be taken during construction stage according to the expert's recommendation. We will

establish exclusion zone around areas of piling and dredging works and have it closely monitored by experienced independent dolphin observer. Once dolphins are found within the zone, the works will temporarily halt until they leave. Besides, we will employ silt curtains and closed-grab during dredging and dumping operations to minimize water quality degradation; and use bore type or vibratory type piling system instead of percussive piling to prevent acoustic disturbance to dolphin. For marine bored piles, installation of steel casing onto rock surface will be suspended during May and June (i.e. the peak months of the dolphin calving season). We will also apply restrictions on working vessels to reduce their disturbance to dolphin

activities. Comprehensive dolphin monitoring will last from works start till a certain period after completion to ensure the effectiveness of these mitigation measures. The Government will also designate a marine park at the Brothers after the completion of the projects to enhance conservation of the marine habitat. The site of the marine park will be identified based on the dolphin habitat and other considerations/constraints.



Central-Wan Chai Bypass and Island Eastern Corridor Link (CWB & IECL)

The Project consists of the construction of 4.5 km dual three-lane trunk road with a 3.7 km long tunnel. It will link up the Rumsey Street Flyover at Central with the Island Eastern Corridor at North Point. The construction works commenced in end 2009 for completion in 2017.

Strategic Environmental Planning

The design of the CWB tunnel was carried out with an aim of minimising disturbance to Victoria Harbour during construction. As required under the Protection of the Harbour Ordinance, "Report on Construction of the Trunk Road Tunnel in Causeway Bay Typhoon Shelter and ex-Wan Chai Public Cargo Working Area" (CCM report) prepared in October 2008 sets out the cogent and convincing materials in support of the proposed temporary reclamation. According to the CCM report, temporary reclamation will be implemented in stages. The temporary reclamation under each stage will be removed before moving on to the next stage. In this manner, the tunnel construction would advance progressively while occupying only minimum water area at any one time and maintaining the operation of the typhoon shelter.

Environmental Impact Assessment

The CWB & IECL Project is a designated project under the Environmental Impact Assessment (EIA) Ordinance and hence an EIA study was conducted for this Project. The purpose of this EIA study was to provide information on the nature and extent of environmental impacts arising from the construction and operation of the developments proposed under the Project. The relevant information had contributed to decision on:

- (i) the overall acceptability of any environmental consequences that would likely arise; and
- (ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against environmental consequences wherever practicable.

Different environmental issues had been addressed in the EIA report including air quality impact, noise impact, water quality impact, waste management implication, landscape and visual impact, ecological impact, land contamination impact and cultural heritage impact.

The study had concluded that these impacts could be controlled to within the criteria with appropriate mitigation measures.

Environmental Monitoring and Audit

Environmental monitoring and audit were recommended for the control of different environmental impacts during construction stage. Details of the recommended mitigation measures, monitoring procedures and locations were presented in a stand-alone Environmental Monitoring and Audit (EM&A) Manual for compliance by the contractors.

Environmental Measures

Some of the environmental measures to be adopted in this Project are highlighted below:

- (i) Landscaped decks, noise semi-enclosures and barriers would be installed at the section of Island Eastern Corridor Link. Road traffic noise along the future IEC at North Point area would be reduced. The landscaped deck over the east tunnel portal area would also provide both visual and noise screening effect to the nearby sensitive receivers.
- (ii) Air quality inside and near the Project area would be enhanced by the introduction of an air purification system into the tunnel ventilation system.
- (iii) Enhancement measures would be formulated to mitigate the potential sources of odour nuisance within the Project area.



Environmental Training and Awards

Striving for improvement of our services through identification of opportunities on environmental training and public participation



Environmental Training

Various training courses have been organised to acquaint our staff with the environmental management system implemented in the Department. One-day Awareness courses aimed at providing basic knowledge of the Environmental Management System (EMS) complying with ISO 14001 for new comers, facilitate the understanding of the principles and operation of the EMS in a short time. There were also 2-day EMS Internal Auditor training course conducted to equip our staff to serve as internal auditors with the necessary auditing knowledge and skills in carrying out internal audits.

For frontline professional and technical staff involving in environmental monitoring, relevant training was provided to them so that they could have a deeper understanding of the environmental checking requirements under our EMS. The training course covered latest changes in handling and reporting of identified non-compliance with legal requirements. To be conversant with environmental legislation and issues, our professional and technical staff were invited to attend a half-day training course conducted by EPD.

The Department continued to provide training for staff who were required to use the computer software "RoadNoise 2000" for the assessment of road traffic noise and design of noise barrier. The training included EPD's requirement on noise assessment method and also hands-on experience of using the software.

To enhance our staff's knowledge on environmental management measures, we co-organized the Joint Safety, Health and Environmental Seminar 2009 with CLP Power Hong Kong Limited, Civil Engineering and Development Department and Environmental Protection Department. The aim of the seminar was to enhance the knowledge of environmental management measures for the professional and technical staff. Over 40 professional staff and technical staff attended the seminar.

Moreover our staff were also encouraged to attend relevant local short courses concerning environmental aspects such as sustainability reporting, sustainable solid waste management, effective noise control policies for metropolis etc. We also sponsored professional staff to attend relevant postgraduate courses in order to gain more in-depth and up-to-date knowledge of environmental management.



Co-organizing Joint Safety, Health and Environmental Seminar 2009

Environmental Training and Awards

With increasing public interests on greening, tree management and conservation arising from public works projects, staff were nominated to attend relevant training courses and seminars for them to update their knowledge of these aspects.

Environmental Training in Construction Sites (Contract No. HY/2007/10)

Environmental training and toolbox talks have been conducted, as well as emergency drills. The topics were in aspects of air quality, water quality, noise and waste management. Trainings were provided 3 times per week to the workers. A reward scheme was organized for the best performance of workers, foremen and subcontractors in consideration of safety and environmental aspects. Moreover, the Contractor was encouraged to participate in various competitions/campaigns, such as: Hong Kong Carbon Reduction Campaign; Hong Kong Awards for

Environmental Excellence (HKAEE) including (i) Sectoral Award (Construction Industry), (ii) Environmental Labels, mainly wastewise label and energywise label; and (iii) Carbon "Less" Certificate; and Hong Kong Awards for Industries – Environmental Performance.

Environmental Awards

Outstanding Environmental Management and Performance Award (OEMPA) and Considerate Contractors Site Award (CCSA)

Development Bureau organized Considerate Contractors Site Awards (CCSA) Scheme to recognize construction sites with good site safety and environmental performance and considerate attitude towards the neighbourhood and the public. In 2009, our construction sites had received one Outstanding Environmental Management and Performance Award (OEMPA) and five CCSA.



Presentation of medals for CCSA Silver Award & OEMPA Merit (New Works): Contract Number HY/2002/26 "Stonecutters Bridge"



Presentation of medals for CCSA Silver Award (Repair, Maintenance, Alteration and Addition (RMAA) Works): Contract Number 12/HY/2005 Highways Department Term Contract (Management and Maintenance of Roads in Sha Tin, Sai Kung & Island Districts 2006-2012 excluding High Speed Roads).

Contract Number HY/2006/03 "Improvement to Pedestrian Subway System at Kwai Fuk Road Roundabout" (CCSA Bronze Award (New Works))

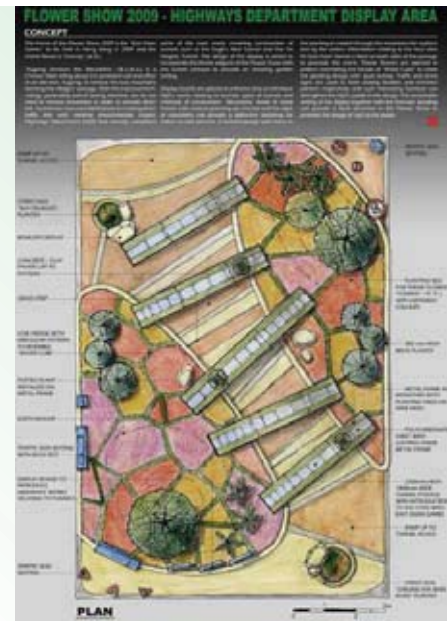


Contract Number 20/HY/2004 "Term Contract Maintenance of High Speed Roads in New Territories East and Hong Kong Island (2005-2013)" (CCSA Bronze Award (RMAA Works))



Hong Kong Flower Show 2009 – Grand Award for Design Excellence

Highways Department always dedicates sincere support in greening works. Last year, we participated in the Hong Kong Flower Show 2009 and provided a landscape display in Victoria Park to introduce the department's works and to assist in promoting East Asian Games held in Hong Kong for the first time. The landscape display also won the Grand Award for Design Excellence. "Yugong removes the Mountains" is a Chinese fable telling about the persistent will and effort of an old man, Yugong, to remove two mountains blocking villagers' passage. Nowadays, we do not need to remove mountains to provide direct link. With the improved technology, tunnels can be built to provide direct links with minimal environmental impact. Highways Department had recently completed some roadworks



Conceptual Design Plan



Presentation of Grand Award for Design Excellence

involving tunnels, e.g. Eagle's Nest Tunnel and Sha Tin Heights Tunnel, to serve the public. The concept of the display was to create an East Asian Games time tunnel through the "landscaped mountains". The mountains represented Hong Kong and the previous host cities for East Asian Games and they provided a distinctive green backdrop. While travelling along the tunnel, visitors could discover the information relating to East Asian Games within the interesting landscape setting and enjoy the blossom of the theme flowers - Cosmos.



The East Asian Games Time Tunnel



Information Board



Feature traffic sign seats

Achievement of Environmental Objectives and Targets and Environmental Targets for 2010

“For the purpose of sustainable development, we have been striving for continual improvement in the protection of environment by setting objectives and targets to enhance our environmental performance.”



Achievement of Environmental Objectives and Targets

We set clear objectives and targets in our environmental management plan every year, and are pleased to conclude that most of our targets for 2009 were satisfactorily met. Our achievements are summarised as follows:

Objectives	Targets set for 2009	Achievement (as at 31 Dec 2009)
Installation of electronic ballasts with a view to reducing energy consumption	To complete installation of 3,000 electronic ballasts for road lighting	3,000 electronic ballasts were installed
Installation of dimmers at footbridges with a view to reducing energy consumption	To complete installation of dimmers at 10 footbridges	10 footbridges were installed with dimmers
Energy saving in Ho Man Tin Government Offices (HMTGO) where the Departmental Headquarters are located (setting electricity saving target based on the results of first energy audit)	To implement measures in minimising electricity consumption by: (a) delamping 100 nos. of lamps on UG/F to 6/F corridors of HMTGO (b) replacing 1,000 nos. of T8 fluorescent lamps with T5 fluorescent lamps (c) replacing 15 nos. of T8 exit signs with LED signs	Target achieved. Works completed in March 2009
Improving indoor air quality	To continue upkeeping the indoor air quality at or above the level of "Good Class" in HMTGO	Target achieved. The indoor air quality of HMTGO was maintained at "Good Class" throughout 2009
Adopting measures in water conservation	To educate staff on water conservation and to consider installing dual-flush toilets and automatic water taps in the toilets of HMTGO	Staff awareness on water conservation was raised. Dual-flush toilets and automatic low flow water taps with sensor mode will be installed in the toilets of HMTGO in 2010
Encouraging the use of recycled paper in the Department	To raise the percentage of recycled paper from 92% to 94% of the total consumption	Almost 94% of total consumption was recycled paper
Recycling materials	To carry out a site trial on the use of concrete paving blocks incorporating recycled glass cullets on a footway and monitor its performance To continue introducing progressively more use of asphalt incorporating reclaimed asphalt pavement in road works To introduce the use of thermal patcher for minor asphalt pavement maintenance in the two new road maintenance contracts due to commence in April 2009	A site trial was carried out with its site performance regularly monitored for about a year Reclaimed asphalt pavement has been used in three maintenance contracts and three reconstruction and improvement contracts for Tuen Mun Road The thermal patcher for minor asphalt pavement maintenance has been used in two new road maintenance contracts

Objectives	Targets set for 2009	Achievement (as at 31 Dec 2009)
Developing low noise road surfacing (LNRS) materials	To complete the study on the noise reduction performance of five different types of LNRS materials laid at Fanling Highway	The study was completed
Planting trees and shrubs	To plant 250,000 trees/shrubs in the vicinity of highway projects	252,000 trees/shrubs were planted
Adopting site office equipment with energy saving label	To use site office equipment with energy saving labels in all new major works contracts	Target was achieved for all 8 new major works contracts
Procuring environmentally-friendly contract vehicle	To procure at least one environmentally-friendly petrol private car model in each of the new major works contracts	Target was achieved for all 8 new major works contracts
Reducing dust emission	To include a particular specification clause for dust suppression in all new major works contracts	Target was achieved for all 8 new major works contracts



Environmental Targets for 2010

We always strive for continual improvement and will continue in 2010 to maintain a sustainable environment with focus on energy saving, housekeeping measures, use of recycled materials and research initiatives as well as greening in the protection of environment. We will make every endeavour to achieve the targets set below:

Objectives	Targets
Installation of electronic ballasts with a view to reducing energy consumption	To complete installation of 3,000 electronic ballasts for road lighting territory wise
Trial Installation of LED road lights with a view to reducing energy consumption	To complete trial installation of 100 LED road lights territory wise
Installation of LED light tubes on footbridges with a view to reducing energy consumption	To complete installation of 200 LED light tubes in 6 footbridges
Further trial of installation of non-illuminated retro-reflective traffic bollards (NRTB)	To complete trial installation of 800 NRTB territory wise

Objectives	Targets
Setting a 5-year target in saving 5% electricity consumption in HMTGO by 2014	To consider reducing energy consumption by (i) installing sensory motion detectors at the pantries and some cellular offices; (ii) placing light screening sheets at the office windows to lower the indoor temperature in summer; and (iii) exploring the feasibility of energy saving devices to be installed at the elevators (e.g. inactive mode where lights are switched off & elevators remain stationary at the ground floor)
Adopting measures in water conservation	To install dual-flush toilets, automatic low flow water taps, low flow showers and sensor type urinals in the toilets of HMTGO
Improving indoor air quality	To continue upkeeping the indoor air quality at or above the level of "Good Class" in HMTGO
To carry out carbon audit to track the effectiveness of Green House Gas (GHG) reduction	To carry out carbon audit twice per year to track the effectiveness of GHG reduction efforts
Encouraging the use of recycled paper in the Department	To continue encouraging the use of recycled paper and maintaining the percentage of recycled paper at 94% of the total paper consumption
Recycling materials	To continue introducing progressively more use of asphalt incorporating reclaimed asphalt pavement (RAP) in road works To carry out a site trial on construction of bituminous materials using a higher proportion of RAP To carry out a site trial on the use of bituminous materials incorporating rubber asphalt
Developing low noise road surfacing (LNRS) materials	To complete the study on the noise reduction performance of three different types of LNRS materials at Chui Tin Street which is a local road
Planting trees and shrubs	To plant 20,000 trees/shrubs in the vicinity of highway projects
Adopting site office equipment with energy saving label	To use site office equipment with energy saving labels in all new major works contracts
Procuring environmentally-friendly contract vehicle	To procure at least one environmentally-friendly petrol private car model in each of the new major works contracts
Reducing dust emission	To include a particular specification clause for dust suppression in all new major works contracts

Hoping that this report could provide you with a glimpse of our dedication and efforts in environmental protection. Should you have any comments on our work, please share with us your views through our homepage on the Internet (address: <http://www.hyd.gov.hk>). Thank you for reading this publication.

