ENVIRONMENTAL REPORT 2006

Highways Department

Contents

Director's Message

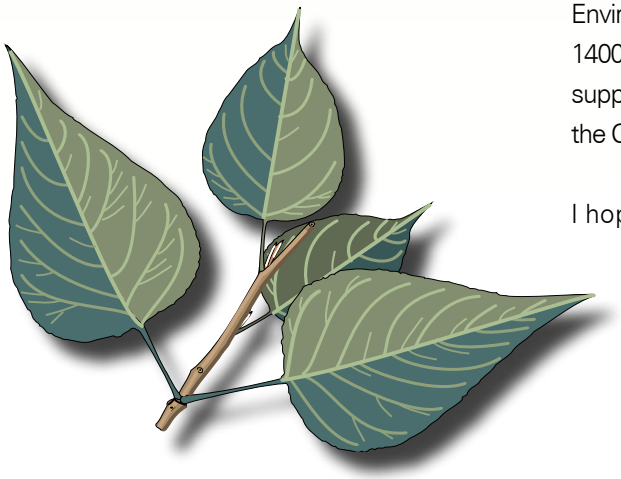
I am pleased to present our fourth Environmental Report, which summarizes our efforts to mitigate environmental impacts of our work in the year 2006.

We have integrated environmental considerations in all stages of our work including the use of a green procurement approach in securing works tenders. To enhance the quality of living environment, we have incorporated as much greening as possible in our road structures. We continue to improve the roadside environment by upgrading the streetscape and enhancing roadside greening. We have pursued research studies on materials to reduce waste and traffic noise and on use of energy-efficient lighting devices.

Our efforts have not gone unnoticed. We won a number of awards for our commitment to improve or reduce impacts to the environment in 2006. They are true recognition of our initiatives and professionalism of our environmental considerations.

Looking ahead, we will continue to enhance our performance in the protection and improvement of the environment through our Environmental Management System, which has been certified to ISO 14001:2004 standard. We will explore every opportunity to show our support to the Action Blue Sky Campaign and our commitments under the Clean Air Charter.

I hope you will find this report interesting.



WAI Chi-sing
Director of Highways
June 2007

About this Report

This Environmental Report covers the period from 1 January 2006 to 31 December 2006. It demonstrates the environmental awareness of our work, and highlights our efforts in environmental management, researches, greening, and green office management. It also reports our achievement of environmental objectives and targets of 2006 and set new ones for 2007.

This report is published in CD-ROM format and uploaded to our web site only to reduce paper consumption.

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 the various activities associated with the 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 Homantin Government Offices, with sub-offices in North Point Government Offices, Cheung Sha Wan Government Offices, Cheung Sha Wan Plaza, and Skyline Tower and Nan Fung Commercial Centre in Kowloon Bay. We have an establishment of some 400 professionals and 1,520 technical and general grades staff. We maintain about 1,984 km of roads and 12,380 roadside slopes in the territory. The total operating expenditure for the financial year 2006/07 is $1,915 million.

Environmental Goal

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

Environmental Policy

Our policy on protection of the environment has been integrated into our Department's Management Policy since July 2003. Under the Environmental Management System, we place emphasis on the environmental considerations of our work. In achieving our goals, we act on the policy by :

- **identifying environmental aspects in all stages of our work, controlling their impacts and preventing pollution as far as practicable;**
- **monitoring the performance of our contractors to ensure good quality of works and prevention or mitigation of potential environmental impacts arising from our projects;**
- **complying with relevant legal and other requirements;**
- **using resources efficiently and minimizing waste arising from our projects; and**
- **identifying opportunities for continual improvement.**

Environmental Management

“We are committed to protecting the environment as far as practicable in our work. We systematically manage the impacts our work may have on the environment and ensure that all our activities are carried out in an environmentally responsible manner.”

Environmental Considerations in Planning and Design of Capital Works Projects

Environmental Assessment of Highway Projects

In delivering a new project, we identify environmentally sensitive areas and try to avoid impacts on the environment at the planning stage. We identify and evaluate the environmental aspects including noise or other nuisance, pollution, landscape and visual effects. We set up operational control requirements on the significant aspects and identify mitigation measures for inclusion into the project documents during the design stage.

We go through the Environmental Impact Assessment (EIA) process as required under the Environmental Impact Assessment Ordinance (EIAO) with an aim of protecting residents and other sensitive receivers from adverse environmental impacts of the proposed works. Apart from integrating environmental concern in project planning and implementation, we take a proactive role and start early dialogue with the relevant authorities under EIAO to identify potential environmental problems and work out effective measures to avoid or minimize environmental impacts at an early stage. We ensure that the works comply with the requirements in the Technical Memorandum under the EIAO.

The EIA process usually covers an assessment on noise, air and water pollution, landscape and visual aspects, and impact on ecology, cultural heritage and archaeological sites during both the construction and operation stages of the project. It identifies the sectors of the community and aspects of the environment likely to be affected, quantifies impact sources, and evaluates the severity of impacts on potential affected uses. If any adverse impact is identified, we provide measures to avoid such impact or to mitigate it to an acceptable level.

Tree Preservation

To enhance the quality of the living environment, we embrace tree planting wherever possible in planning and design of our projects. We pay particular attention to tree preservation by minimizing tree removal. Where mature trees are to be affected, they are transplanted as far as possible. Compensatory planting is normally provided in the proposed landscape design. We discuss with the relevant authorities on the proposed treatment of any rare or protected species of affected plants that may have ecological, amenity and aesthetic heritage value.

Aesthetic Design of Highway Structures

We examine the visual aspects of a project. Where necessary, we seek advice from the Advisory Council on the Environment and the ACABAS (Advisory Committee on the Appearance of Bridges and Associated Structures) with respect to the aesthetic acceptability of the design of bridges and associated structures. To improve the environment, we provide permanent planters on footbridges and flyover in every practicable situation.

Environmental Design of Noise Barriers

Taking into account the speciality and culture of the district, we aim at designing noise barriers with appropriate scale and character that are compatible, matching with the existing noise barriers in the vicinity and blending into the local environment. The aim is to design noise barriers that have aesthetic appeal without being dominant in the field of view. Use of green walls shall be considered wherever possible. We also incorporate the use of renewable energy technology in the design of noise barriers wherever practicable in order to promote the use of renewable energy.

Green Procurement in Works Tenders

Incorporation of environmental clauses into the tender documents

As a general policy, all environmental clauses promulgated by the Environment, Transport and Works Bureau are incorporated into the tender documents. These include:

- Pollution control
- Waste management
- Hardwood not to be used
- Avoidance of nuisance
- Enhanced site cleanliness and tidiness
- Control of mosquito breeding on construction sites
- Tree preservation

In the tender documents, tenderers are particularly drawn to the attention of the following contract requirements on the use of environmentally friendly plants/materials:

- Constructional plant powered by diesel fuel working must use ultra low sulphur diesel
- Quiet equipment and techniques

For projects requiring environmental permits under the Environmental Impact Assessment Ordinance, the Environmental Permits issued to the Department are included in the contracts, requiring the contractors to observe and abide by the conditions set out in the Permits.

Tender submission and tender evaluation

As part of the tender submission, tenderers are required to outline their waste management plan. For works tenders requiring technical proposals to be submitted by tenderers for tender assessment, extra credits will be given to tenderers who propose methods of construction that can reduce the construction noise or construction waste well below the normally expected level; that can increase control in environmental pollution; and that have adopted environmentally friendly plants, products or processes.

As a condition of tender where tenders are evaluated through a marking scheme, tenderers are required to declare "convictions "or "no conviction" under the following environment-related Ordinances:

- Air Pollution Control Ordinance
- Noise Control Ordinance
- Waste Disposal Ordinance
- Water Pollution Control Ordinance
- Dumping At Sea Ordinance
- Ozone Layer Protection Ordinance
- Environmental Impact Assessment Ordinance

In all cases, environmental conviction records and conviction records under section 27 of the Public Health and Municipal Services Ordinance are checked. The above factors are duly considered in the tender evaluation prior to award of contracts.

Electronic dissemination of tender documents

While the existing practice of issuing hard copies of tender documents continues, the electronic versions of tender documents for works contracts are also disseminated in the form of "Electronic Dissemination Packages" to the tenderers. Tenderers are also allowed to submit tender partly in electronic format.

Waste Management in Capital Works Projects

In order to tackle the serious and long-term problem of Construction and Demolition (C&D) materials in Hong Kong, our contractors in capital works contracts are required to prepare and implement Waste Management Plans (WMP) incorporating proposals on on-site sorting of C&D materials and on minimization of their generation.

Through the Pay for Environment Scheme, contractors are also encouraged to put more effort on waste management, with processes briefly illustrated below:

Measures to reduce/minimize generation of C&D materials

The contractor shall identify work processes or activities that will generate C&D materials during construction and propose measures to reduce/minimize their generation - in particular metallic waste, timber, paper/cardboard packaging and chemical waste.

On site sorting of C&D materials

The contractor shall devise a system for sorting of C&D materials and separation of inert and non-inert portions at source as far as possible.

Sorting of concrete debris and soft material on site

Sorting of non-inert material on site

Arrangement for collection of recyclable materials by recycling contractors

The contractor shall make arrangements with recycling contractors to collect the materials sorted and with care.

Recyclable wastes regularly collected by recycling company

Waste metal sorted and collected by recycling company

Mechanism for recording C&D materials removed off site

The contractor shall establish a disposal recording system similar to the trip-ticket system, to ensure proper disposal of C&D materials.

Registration with Government as a chemical waste producer

The contractor shall store, label, handle and dispose chemical waste, if any, in accordance with legal requirements.

A designated area for the storage of chemical waste

Designated area for collection and storage of construction waste

A designated area for the disposal and segregation of construction waste

A chute for collecting waste at a slope

Tool box talk for workers

Tool box talks when appropriate are provided to workers about the concepts of site cleanliness and waste management procedures, including waste reduction, reuse and recycling.

Tool box talk for workers

Reuse of materials

Contractors are encouraged to reuse the C&D materials as far as practicable. In the Castle Peak Road Improvement project, slope-upgrading works included both cut slopes and fill slopes. Bedrock and concrete removed from cut slope were broken down to rock fill material and used at fill slopes. Hydraulic breakers were deployed to break down the rocks to nominal Grade 400 size, which were then compacted in layers. Surplus general fill material excavated during the formation of cut slopes was also used as road sub-grade material. Similarly boulders and bedrock were broken down to nominal Grade 700 size for use as an under-layer in sea wall construction. Such reuse of existing materials within the site reduced the need for waste disposal and import of materials.

Breaking of bedrock and concrete during the formation of cut slope for reuse on site

Secondary breaking of rock and concrete to Grade 400 size

Reuse of broken rock and concrete for the construction of rock fill slope

Reuse of bedrock and boulders broken on site as Grade 700 rockfill for seawall underlayer

Monitoring of Contractors' Performance on Environmental Protection

In general, the contractor's overall performance including the individual aspect of performance on "environmental pollution control" is subject to quarterly review after the tender is awarded. In the event of unsatisfactory environmental performance, it will be reflected in the Contractor's Performance Report, which may lead to possible suspension of tendering.

Environmental Management System

Since early 2006, our Department has fully implemented the enhanced Environmental Management System (EMS) certified to ISO 14001:2004. Under the enhanced EMS, the contractors' environmental performance and their compliance with the environmental requirements including various legislations are regularly checked and monitored.

We monitor the environmental performance of our contractors through:

- Regular environmental walks jointly conducted by the contractor and the Engineer's Representative
- Regular inspections and monitoring by the Environmental Team and the Independent Environmental Checker required for designated projects under the Environmental Impact Assessment Ordinance
- Monthly Site Safety and Environmental Management Committee Meeting chaired by the Engineer's Representative
- Regular environmental inspections by our project officers

Besides, task-oriented audits to assess compliance with legislative and other requirements are conducted, such as anti-mosquito audits.

In the event that a contractor is found to be non-compliant, preventive action and /or corrective action will be identified and implemented. With an aim of monitoring closely the contractor's follow-up actions, any non-compliance with legal requirements (i.e. potential offence / offence) once identified will also be brought to the attention of the senior management in the Department. Project staff regularly review the progress of the follow-up actions taken and report them to the senior management until completion of the actions.

Pay for Safety and Environment Scheme

Under ETWB TCW No. 19/2005 "Environmental Management on Construction Sites" and its interim guidance note issued on 19 June 2006, the established framework of the pay for safety scheme was extended to cover environmental protection on public works construction sites.

For capital works contracts having estimated contract sums greater than $20M and tendered after 1 August 2006, the Department has included them under the "Pay for Safety and Environment Scheme".

The part for environment includes two aspects – environmental management plan; and environmental nuisance abatement measures on site. The contractor will receive a monthly payment only if it has satisfactorily performed the items as specified in the contract. With the implementation of this scheme, the performance of our contractors on environmental protection is further improved.

Environmental nuisance abatement measures

Noise barrier

Movable water treatment facilities

Covering of open stockpiles / temporary slopes

Environmental Trainings

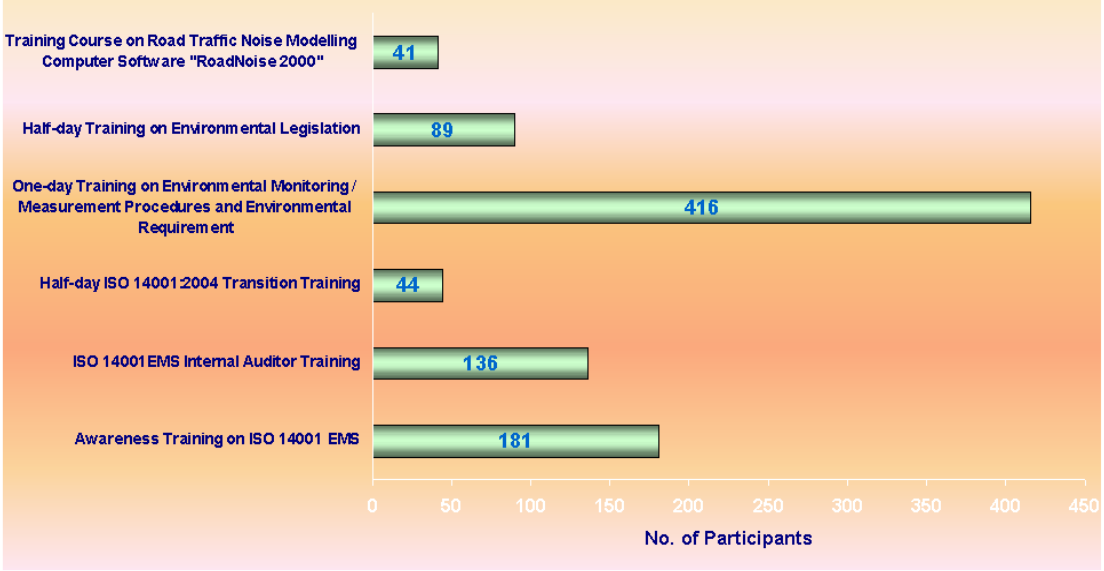
The Department attaches importance to environmental training of staff. All staff newly posted to the department are required to attend an awareness course on the EMS. Colleagues are encouraged to attend local short courses on environmental aspects, such as road traffic noise assessment, tree preservation, public participation in Environmental Impact Assessment, use of low noise road surfacing, etc.

In 2006, our Training Services Unit arranged training on a two-day EMS Internal Auditor courses for nominated staff so as to train up a sufficient pool of internal auditors. With the conversion of the department's EMS to ISO 14001:2004, a half-day training was provided to those staff having been trained to the old version so as to acquaint themselves with the new requirements.

In order to brief our frontline staff on the environmental checking requirements as well as on the environmental monitoring procedures, a tailor-made one-day training was conducted. During the year, we continued to enlist the assistance of Environmental Protection Department (EPD) to deliver a series of seminars on environmental legislation for our professional and technical staff.

We have procured the computer software "RoadNoise 2000" used for the assessment of road traffic noise and design of noise barrier. In 2006, a training course on application of this software and on EPD's requirement on noise assessment method was conducted so that our staff could get hands-on experience of using the software.

Apart from the above, we also organized regular internal seminars to promote experience sharing among the professional staff. Seminars on the environmental management of the "Hong Kong-Shenzhen Western Corridor" project and the "Improvement to Tung Chung Road" project were well received by the participants.



Asset Management

We embrace optimal management of physical assets in the Department to maximize value, improve utilization and performance of the assets.

We proactively manage our assets by building up computerized inventory records, carrying out road condition surveys and enhancing the aesthetic values of our roads and highway structures. The Department is trying more means to provide greening on highway structures and a better pedestrian environment by enhancing the streetscape especially in built-up areas. We are going to redevelop our computerized Utility Management System so as to further enhance the efficiency on processing of excavation permits, and on control of excavation works on streets. Please see the following chapter on how we are improving our assets.

Asset Management

“We manage our assets from horizontal to vertical. We are now trying more means to provide greening on highway structures and to enhance streetscape.”

Investigation Study for Greening of Highway Structures

It has been an established practice of Highways Department to incorporate as much greening as possible when new roads are planned. Under the existing arrangement, greening is normally provided at ground level of roadsides, and underneath or around elevated structures. As a further step to enhance the urban environment with more greenery and to soften the appearance of road structures, the department is conducting an investigation into providing greening on the deck, roof or on the columns and piers of road structures by innovative but sustainable measures.

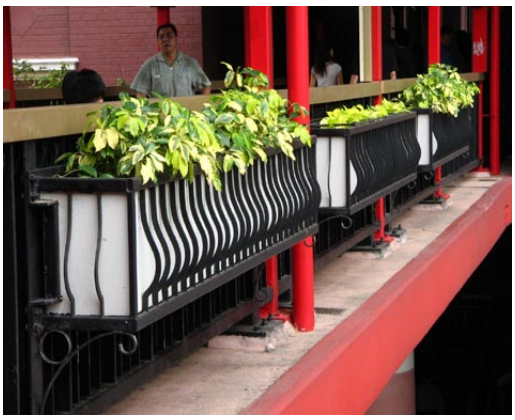
A desk-top review on local and overseas experience in Guangzhou, Singapore, Japan and Australia has been carried out. We are now comparing various greening treatments available in the market, which may be applicable in Hong Kong, taking into account their impacts on structural adequacy, operation safety, and maintenance implications. While planter boxes have been installed along parapets of some footbridges and around the structure columns in various locations, we are exploring the feasibility of planting on roof of footbridges and on parapets along flyovers. On-site trials will be conducted to testify the long-term practicality of the recommended greening options.

Pleasant environment created through greening at structures

Tsuen Wan Road

Greening of Footbridge

Po Kwong Village Road Footbridge



Sheung Wan Western Market Footbridge

Investigation Study for Greening and Aesthetic Design of Noise Barriers

Noise barriers and enclosures are installed primarily to protect roadside residents from traffic noise and are not commonly provided with greening. We carried out a study in 2006 on noise barrier greening and aesthetic design practices, and arranged trials on 4 types of greening measures on noise barriers. They include: green walls; planters and climbers; earth mounds; and green roof.

The features of these measures are:

1. Green Wall – A proprietary growing medium is sandwiched within vertical structural meshes to act as the noise barrier. Plants grow out sideways from the medium.

2. Planters and Climbers – Climbers are planted to cling on to the surface of the noise barrier with suitable surface or an artificial growth medium. A support frame and cables may be required for rapid vertical greening coverage. Climbers may be augmented by shrubs at planters constructed at the base if space permits.

3. Earth Mound – Earth mounds are noise barriers themselves. They may be natural mounds or constructed by placing earth on an interlocking A-frame system or interlocking units. Planting appears at the surface.

4. Green Roof – A lightweight growing medium with planting is placed on the roof of structures or noise enclosures.

Overseas Examples of Greening Methods

Green walls

Textured concrete encourages climber growth

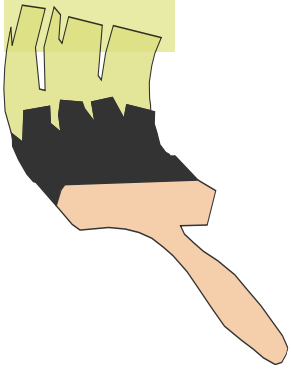
Walls covered with twining climbers on cables

Earth mound using interlocking stacking system

A number of locations have been identified to carry out trials on these measures and design is being carried out. The locations are mainly along public roads. The works will commence in 2007 and will be completed in 2007 or 2008.

Photomontage of Noise Barrier Greening

Green wall – Approach Road to Tseung Kwan O Road



Planters and climbers – Yuen Long Highway

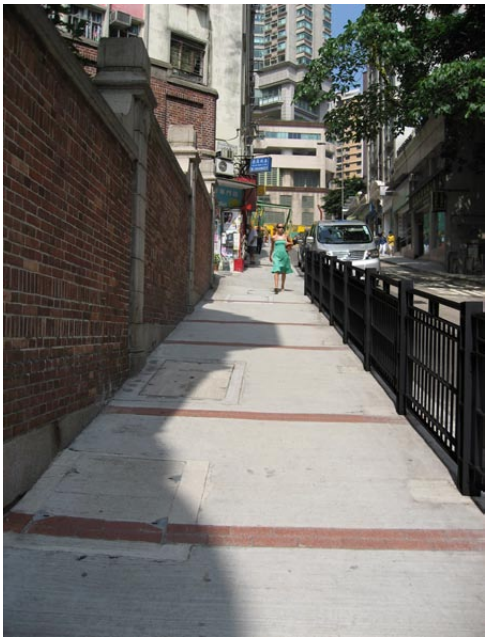
Green wall – Tsing Tsuen Road near Rivera Gardens

Streetscape Enhancement and Greening

In addition to maintaining the road network and facilities, the Department also strives to improve their aesthetic value by streetscape enhancement and greening.

Streetscape enhancement in urban areas

Streetscape enhancement works, with improvements to paving, lighting, street furniture and incorporation of greening were carried out for a number of streets in 2006. These were carried out in conjunction with pedestrian schemes in SoHo, Sham Shui Po and Jordan. Footpath widening and improvement were also completed for Castle Road and Caine Road in Midlevels, the latter to complement the renovation of the historic building Kam Tong Hall and its conversion into the Dr Sun Yat Sen Museum.



View of Castle Street outside Dr Sun Yat Sen Museum after footpath widening and streetscape enhancement

We also worked with other government departments such as Civil Engineering and Development Department on streetscape and greening upgrading projects. This resulted in comprehensive upgrading of the streetscape with a coordinated design.

SoHo Pedestrian Scheme – Street trees implemented at localised footpath widening

View along Caine Road with granite paving with clay insets leading to the Museum

In order to tap the resources of the private sector and encourage their enthusiasm to improve their local street environment, Highways Department partners with District Councils, developers, and community organisations. Examples are the upgrading of the Central District around Hong Kong Landmark initiated and sponsored by Hong Kong Land Ltd and the upgrading of Hollywood Road by Henderson Land Ltd. A number of streetscape improvement projects by the Urban Renewal Authority are being constructed or under planning in Tsim Sha Tsui, Tai Kok Tsui, Tsuen Wan, Sheung Wan, and Sham Shui Po and we are invited to participate.

Elegant facelift to streets maintained by Highways Department

Des Voeux Road Central

Pedder Street, Central

Hollywood Road

Streetscape enhancement of Cheung Chau Promenade

The enhanced works involve repaving a section of San Hing Praya Street in the vicinity of the Ferry Pier and Public Pier along the waterfront of Cheung Chau. This area is the 'gateway' to Cheung Chau. Two accent paving patterns were created in front of the 2 piers to accentuate the arrival experience of the visitors. The rest of the enhanced area has adopted a relatively simple paving pattern in earthy tone to complement the local rural characteristic. Apart from paving, the standard railings along the waterfront were also replaced with decorative railings in blue colour. The existing tree avenue together with the enhanced works have created a highly readable and organized streetscape environment along this prime area of Cheung Chau for the enjoyment of both local residents and visitors.

BEFORE

AFTER

BEFORE

AFTER

BEFORE

AFTER

Greening

As many of the proposals arising from the Greening Master Plans (GMP) promoted by Civil Engineering and Development Department (CEDD) are on public roads and highway structures, Highways Department has been providing advice during the formulation of GMPs. For short-term GMP proposals, close coordination between the two departments is necessary and sometimes greening proposals are entrusted to Highways Department for construction. On other GMP proposals we upgrade the paving, lighting and street furniture, in tandem with the greening works impemented by CEDD. For instance, CEDD has planted trees, shrubs and groundcovers along Nathan Road in Tsim Sha Tsui. To complement the planting works, the two departments have joined forces by renovating the paving and street furniture. The result will be a comprehensive facelift to Nathan Road, one of the well-known and popular commercial streets in Hong Kong.

Pilkem Street Traffic Calming Scheme, Jordan – Streetscape upgrading integrated with GMP works, resulting in comprehensive environmental improvement.

GMP greening works and streetscape upgrading will result in comprehensive improvement to the environment

View of Nathan Road before upgrading works

Photomontage of Nathan Road

Improvement to Utility Management System (UMS)

The UMS is a computer system being used by the Department for the processing of excavation permit applications under the Land (Miscellaneous Provisions) Ordinance. The UMS was rolled out in October 1997. At that time, advice on Lighting, Signing and Guarding proposals (from Hong Kong Police Force) and Temporary Traffic Management proposals (from Transport Department) on the permit applications were delivered to Highways Department in hard copy. The data were uploaded or digitized into the system. In September 2002, a web-based system known as Internet Interface to Utility Management System (IIUMS) was rolled out to enable the Police, Transport Department and applicants to process the application via the Internet. The data in the internet system and the original system are synchronized twice a day (hence the updated data in one system could not be available in the other until a certain period). In April 2004, an enhancement on both systems was carried out to cope with the changes brought about by the amendments to the Land (Miscellaneous Provisions) Ordinance to effect fee charging and tighter control of excavation process.

To take advantage of the latest development in IT technology and to further improve the efficiency of excavation permit processing, Highways Department commissioned Office of the Government Chief Information Officer (OGCIO) to study the redevelopment of UMS, which was completed in 2006. The study recommended the future system (Excavation Permit Management System) to be a single Web based system. The future system will eliminate the need of data replication and maintenance of two existing separate systems and will greatly reduce paper copies. It will also enhance the capacity of electronic information submission/dissemination and coordination. By completion of the future system in mid-2008, the efficiency and effectiveness of road opening management will be improved (hence fewer road openings and shorter durations leading to less environmental nuisance and pollution), and the user-friendliness of the system will be greatly enhanced.

Research and Technology

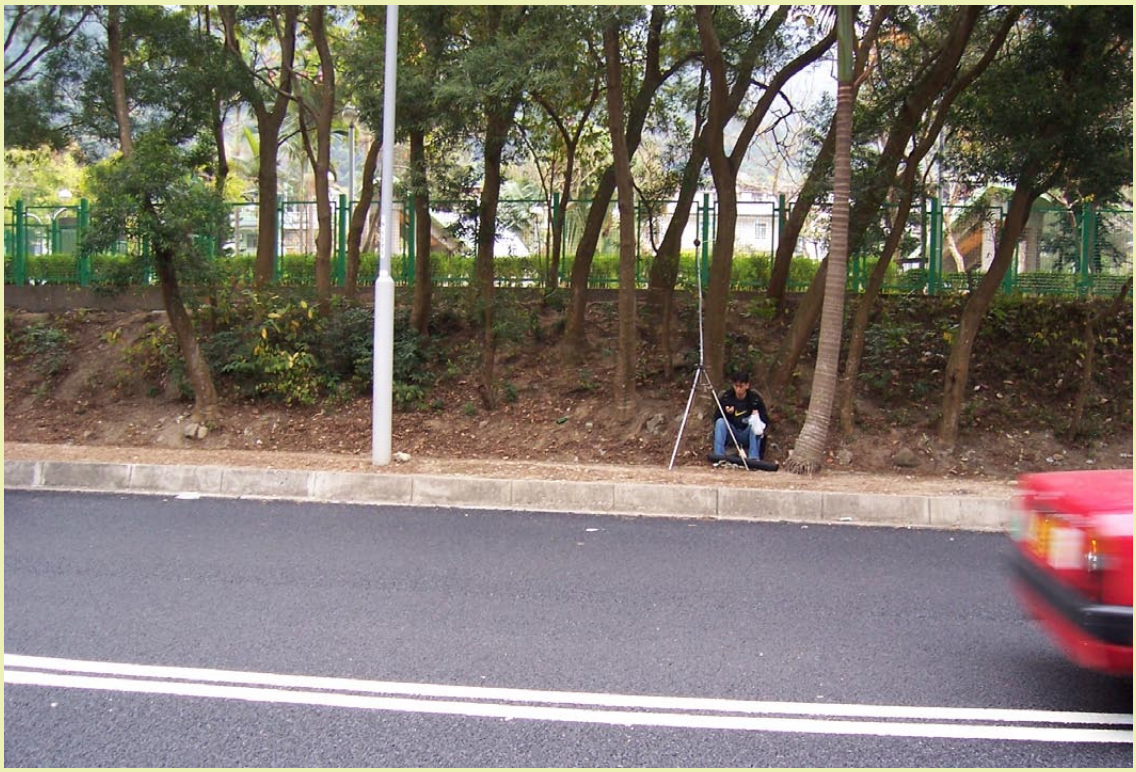
“We have been carrying out research studies and trials on various fronts including low noise surfacing, recycled materials, common utility enclosure and energy-efficient devices, in order to derive more environmentally friendly measures.”

Low Noise Surfacing

The low noise surfacing material commonly used in Hong Kong is porous friction course. It is a special type of bituminous highway surfacing which was originally designed to improve skid resistance by virtue of its open texture. Overseas research revealed that open texture bituminous highway surfacing could also reduce traffic noise induced by the interaction between road surface and vehicles tyres of high-speed traffic.

Owing to its porous nature, friction course material is weaker than normal asphalt materials and the road will have to be resurfaced in 3 to 4 years. The cycle would be shorter at locations where there are a lot of stop/go and turning activities of vehicles. To enhance the durability of the friction course material, we have collaborated with the Hong Kong Polytechnic University to conduct a research on durability. The findings of the research indicate that friction course material incorporating a new type of polymer modified bitumen is more durable than the conventional type of polymer modified bitumen friction course.

To test the noise reduction performance of the new material, trial laying of the material in various thickness and maximum nominal aggregate sizes was carried out in Chui Tin Street of Shatin in February 2006. Up to the present, noise reduction of 1.5 dB(A) to 2.7dB(A) compared to the original bituminous surfacing is maintained. Further trial laying is planned to be carried out in Fanling highway in mid 2007 for monitoring its noise reducing performance in expressway.



Traffic noise measurement at Chui Tin Street, Shatin

Reuse of Construction and Demolition Materials

Reclaimed Asphalt Pavement

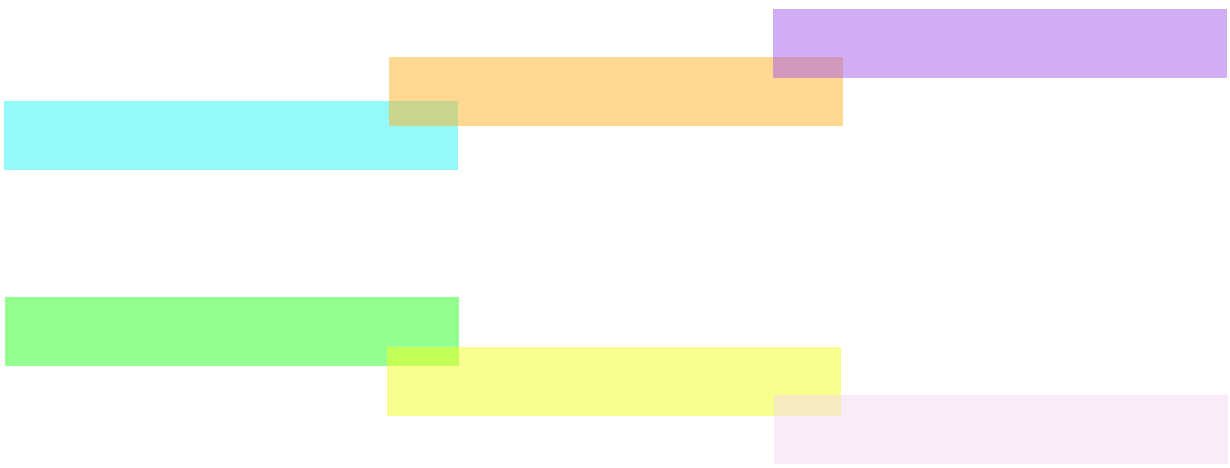
Further to the study concluding that the performance of asphalt mix using reclaimed asphalt pavement (RAP) was comparable to that of virgin mix, we have incorporated in the new General Specification (GS) for the public works contracts the use of RAP in wearing course and base course of road pavements.

Recycled Aggregates as Sub-base

Monitoring on the performance of the recycled aggregates used as sub-base in Fo Tan Road continued in 2006. The performance of the footpath and carriageway using recycled aggregates as sub-base was generally found satisfactory. Although cementing effect was observed at road section where pure recycled aggregates had been used, no reflective cracking was found in the carriageway. Technical report will be issued on the findings of the site trial.

Common Utility Enclosure

With a view to reducing the number of road excavations in Hong Kong so as to minimize nuisance to the public, we started in 2002 to investigate into the feasibility of Common Utility Enclosure (CUE) in both new developments and built-up areas in Hong Kong. CUEs are underground structures that provide a common passage for utility services. With a CUE, there is no need for road excavations during installation and maintenance of utilities (hence precluding environmental nuisance, pollution as well as generation of construction waste). The study has been completed in 2004 with findings on legal, financial and technical aspects. In 2006, we implemented small scale CUEs at two road locations to gain experience on the technical aspect. One is at Horizon Drive at its junction with Chung Hom Kok Road in Hong Kong. The other is at Yan Cheung Road in Kowloon. A culvert type CUE design is adopted in this trial. Consulations with utility undertakings were made on the construction and we are actively liaising with interested utility undertakings regarding the terms and conditions for installation of their facilities in these two CUEs.



Design and Use of Energy-Efficient Devices

To avoid rapid depletion of the world's limited resource of fossil fuels, to reduce the greenhouse warming effect and to combat the rising energy cost, Highways Department has been researching into energy saving of public lighting, using dimming technology in the road lighting system and replacing the existing traffic bollards by non-illuminated retro-reflective bollards.

Dimming Technology

In 2006, we have conducted pilot schemes at different areas of Kowloon and New Territories on two different dimming technologies i.e.
(i) a central dimming system, and
(ii) dimmable electronic ballasts. The interim finding indicated that energy saving could be achieved by dimming of public lighting but the two technologies under the pilot schemes have pros/cons and limitations, such as high capital cost, high initial failure of dimmable electronic ballasts etc. We will continue the research and to investigate also different dimming profiles.

Non-illuminated Retro-reflective Traffic Bollard

In order to reduce the amount of electricity consumption, investigation has been made to replace existing illuminated traffic bollards by non-illuminated retro-reflective ones. A site trial was conducted and the proposal with preliminary findings has been submitted to the Road Safety Research Committee. Trial use of non-illuminated traffic bollards will be carried out at more junctions to reinforce the effectiveness of the proposal.

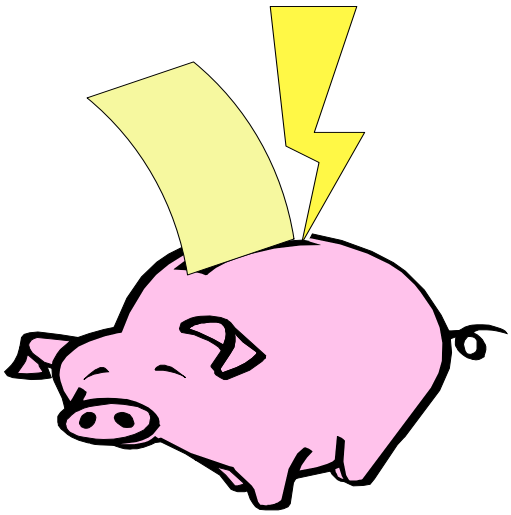
Illuminated Traffic Bollard

Non- illuminated Retro-Reflective Traffic Bollard

Green Office Management

“To sustain a green office environment, we have followed the 3-R principles “Reduce, Reuse and Recycle” in our day-to-day office management.”

The Highways Department Green Committee was first formed in 1994 to develop, implement and monitor green office practices. We endeavor to sustain a green office environment and adopt various green measures in housekeeping to economize the use of natural resources. The main features of the green measures are summarized as follows:



Paper Saving

- Minimize photocopying paper consumption
- Use both sides of paper for printing and photocopying
- Use blank side of used paper for drafting/photocopying for internal reference
- Use electronic means extensively for communication, including the sending of electronic files instead of hard copies
- Reuse envelopes and file covers
- Encourage use of recycle paper

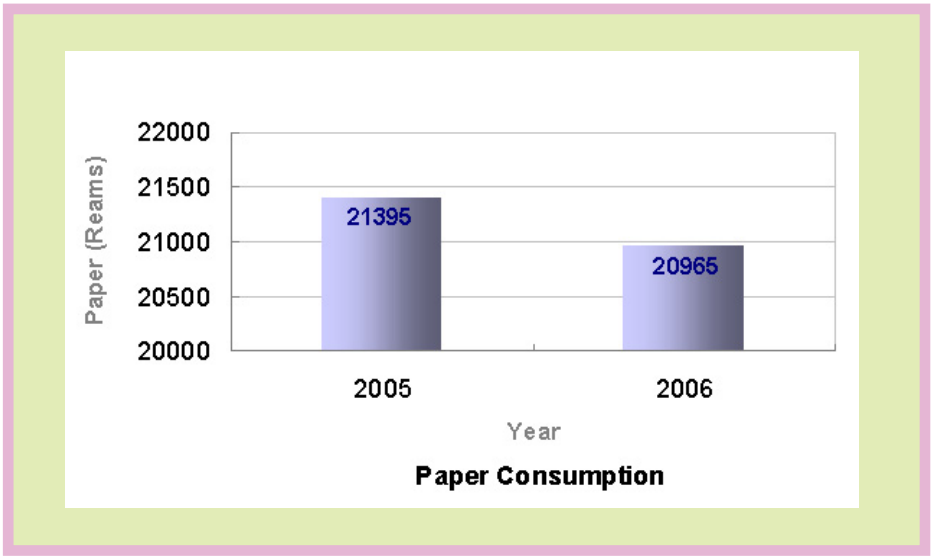
Energy Saving

- Appoint Energy Wardens in every Office / Division to monitor lighting
- Maintain air-conditioning not lower than 25.5 °C in summer
- Switch off lights during lunch or when away for long hours
- Switch off computer equipment and electric appliances not in use
- Review lighting level arising from change of room use
- Monitor electricity consumption
- Encourage use of staircase for interfloor traffic
- Use automatic switch-off devices on water taps in toilets

Waste Collection for Recycling

- Put up green boxes to collect reusable envelopes and papers for reuse
- Collect computer printer toner and ink cartridges for refill and recycling
- Put up recycling boxes to collect paper, used CD, plastic bottles and aluminum cans for recycling

With the concerted efforts of our staff, the Department achieved a saving of 2% in paper consumption in 2006 when compared with 2005



To maintain impetus of green measures in housekeeping, we conduct annual environmental audits on our 14 offices located in different premises. The objectives of conducting the annual environmental audits are:

(i) to assess compliance with the green housekeeping guidelines;

(ii) to identify non-compliances and recommend remedial actions;

(iii) to promote good environmental management; and

(iv) to increase staff awareness of green management and occupational safety and health initiatives.

Clean Air Charter

"Every small step taken by each individual to support the clean-air initiatives in our daily lives can help reduce air pollution."

The Chief Executive, Mr. Donald Tsang

Energy Saving and Air Emission Reduction

The Chief Executive Mr. Donald Tsang launched the Action Blue Sky Campaign on 25 July 2006, reinforcing the Government's determination to improve Hong Kong's air quality. Mr. Tsang signed the Clean Air Charter (the Charter) on behalf of the Government of the HKSAR on 27 November 2006. To show our support to the Campaign and our commitments under the Charter, we have implemented the following measures relevant to the course of our operations to help improve Hong Kong's air quality.

Energy Saving Measures Done in the Offices of Highways Department

We continue to minimize the use of energy and other resources in our offices. We have replaced all T-12 florescent tubes in our offices with T-5 tubes, and maximized the use of natural lighting and creating openness in designing our offices. We have maintained air-conditioning not lower than 25.5°C in summer. We achieve savings through the 3-R principles "Reduce, Ruse and Recylce" in our day-to-day office management.

To enable better control of electricity usage by office equipment and lighting in individual floors of Homantin Government Offices where the Department's Headquarters are located, we will install separate electricity meters in individual floors in 2007. This will provide very useful data to enable floor occupants to review their consumption pattern and take appropriate measures in case of upsurges.

To reduce vehicle emission, our driving staff, and those of our contractors have been instructed or appealed to switch off vehicle engines while waiting. Surprise inspections to ensure strict compliance with the instruction are conducted by the supervising staff.

Energy Saving for Public Transport Interchange Ventilation

Mechanical ventilation of electric fans is provided in covered public transport interchanges (PTI) to improve the ventilation to avoid excessive accumulation of air pollutants in PTI. The situation of air pollutants in PTI is monitored by regular air quality measurements. If necessary, the ventilation can be increased or decreased by adjusting the operation of the ventilation fans so as to ensure that the concentration of air pollutants is within the acceptable limits. This is to minimise the consumption of energy for provision of mechanical ventilation in the PTI.

Fan schedule of the PTI at Nan Fung Centre has already been adjusted to achieve energy saving

Energy Saving for Public Lighting

In view of significant consumption of electricity by the Public Lighting System, we continued our effort in 2006 to improve the efficiency of the appliances. In 2006, we have replaced 2,800 lamps and lanterns by those with lower wattage and higher efficiency. The annual savings in electricity consumption are about 620,000 kWh. As a trial scheme, we have introduced 1,500 electronic ballasts to replace the existing electromagnetic ballasts in the public road lights. The annual savings in electricity consumption are 214,000 kWh. The total savings in electricity consumption arising from the above initiatives amount to 834,000 kWh.

Pedestrian Schemes

Creating a better pedestrian environment with streetscape works is one way to enhance the quality of life. By encouraging walking, non-essential traffic is reduced and air quality is improved. Since 2000, in working together with Transport Department, we have implemented pedestrian schemes in a number of busy districts, including Causeway Bay, Mong Kok, Tsim Sha Tsui, Jordan and Sham Shui Po.

We are continuing our efforts to implement pedestrian schemes, together with streetscape and greening works where feasible. As at the end of 2006 we have implemented a total of 6 full-time pedestrian streets, 23 part-time schemes and over 32 traffic calming or footpath widening schemes. In 2006 Elgin Street, Peel Street, and Staunton Street in So Ho were completed as well as Fuk Wa Street and Pei Ho Street in Sham Shui Po, and Nanking Street and Pilkem Street in Jordan.

Although the streets are congested, with the footpath widening measures street tree planting has been achieved, which provide shade and a touch of nature in the city.

Tree planting of Grevillea robusta, the theme street tree in Nanking Street, Jordan Pedestrian Scheme

Tree planting of Tabebuia chrysotricha, Golden Trumpet Tree in So Ho Pedestrian Scheme

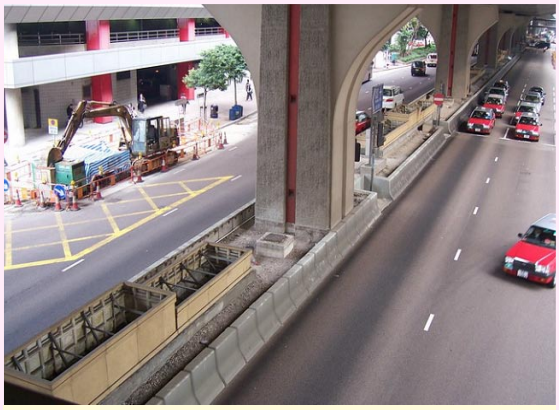
Greening in the Urban Environment

In support of Government's green policy, Highways Department strives to maximize greening opportunities, even in congested urban areas.

Central medians under flyovers are often hostile areas for greening - dark without sufficient sunlight, covered with little rainfall, often dusty and windy, but highly visible to passing traffic.

As a first phase, over 35,000 plants of palms, shrubs and ground covers, which can survive in such difficult growing environment, have been retrofitted in the central median of Connaught Road, Sheung Wan to green this strategic corridor.

Narrow central medians that were once considered to be not suitable for planting have also been reviewed by the Department for introduction of greening. With the support of Transport Department, railing in some of these medians are now replaced by planting that helps to improve the roadside air quality as well as street environment. The hard-paved area of the central median along Tong Ming Street in Tseung Kwan O is now home of 17,000 of trees, shrubs and groundcovers.



BEFORE

AFTER

BEFORE

AFTER

Environmental Awards

“From design to implementation,we are awarded for our care to our environment.”

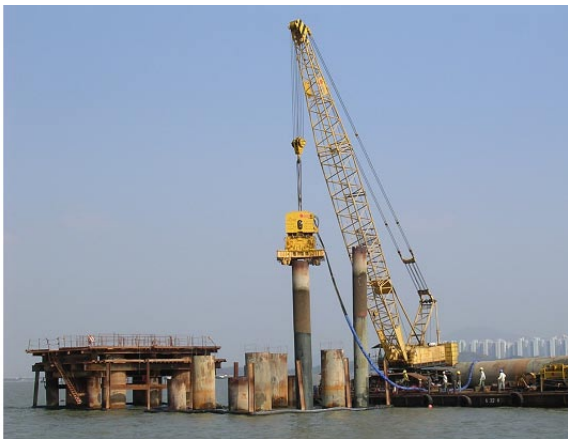
David Alsop Sustainability Award 2006

The Hong Kong-Shenzhen Western corridor stretches across the ecologically sensitive Deep Bay. The project has been awarded the " David Alsop Sustainability Award 2006" by the Institution of Structural Engineers for achievement in structural design and sustainability with the following initiatives:

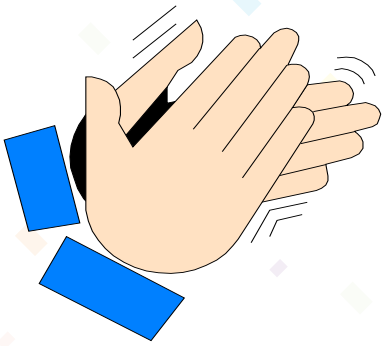
The structure for the Hong Kong section is founded on nearly 500 large diameter bored piles in Hong Kong waters. A temporary access bridge across the inter-tidal mudflats was constructed for carrying out construction works and drainage of waste water. Temporary platforms were also erected at each pile group location for stationing workers and machinery so that construction of foundation can be proceeded. The size of the platforms was kept small while plant and materials were only delivered at the appropriate time. Construction of pile-caps was carried out within sheet-pile cofferdams and silt curtain to minimize water contamination.

The construction works were completed within a short time frame of 27 months without causing adverse impact to the environment in Deep Bay.

Marine Bored Piling



Marine piling using temporary access Bridge



HKILA Awards

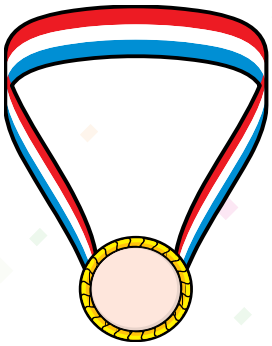
With the joint effort of Highways Department and the Urban Renewal Authority, our project "Sheung Wan Fong Streetscape Enhancement" won an Award of Merit in the 2006 Hong Kong Institute of Landscape Architects, Landscape Design Awards "Excellence in Landscape".

The design is based on the "hub and spokes" concept, with the Western Market and the piazza as the "hub", known as Sheung Wan 'Fong', and other theme streets as the "spokes". The aim of the project includes the provision of open space for activities held by local communities and improvement of the streetscape along the main streets in Sheung Wan by advocating the concept of "theme street" for promoting traditional Chinese trades including ginseng, bird's nest, herbal medicine and dried seafood.

The project included the provision of planting in featured planters with stylish stonewalls, also serving as seating, in harmony with the "Compass" motif design paving. Tree and shrubs planting improves the greening of the local community and the upgrading of site furniture and paving uplifts the environment. In addition, portable planters and planter boxes mounted on roadside railings enhance the streetscape.

The award presentation

The piazza is a popular shaded resting place for local residents and office workers.



Hong Kong Flower Show 2006 – Gold Award for Outstanding Exhibit (Landscape Display)

With concerted effort, we have won the Gold Award for Outstanding Exhibit (Landscape Display), which is the highest standing among other gold awards in the Flower Show.

Our design themes are Highways Department serves Hong Kong 20 years and the theme of Flower Show 2006 "Enchanting Beauty".

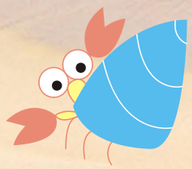
The pavilion space is divided into 3 areas for visitors to experience and enjoy. The journey starts at the walkway of the miniature cable-stayed bridge. It rises gradually symbolizing the vision of Highways Department 'to develop and upkeep the road network as well as to plan and implement railway development to world class standards.' The bridge tower reaches a height of 6m and has 20 stay cables,

which symbolizes the establishment of the Department for 20 years since 1986. Different pavers used in different era are paved along the walkway, reminding visitors the changes in our streetscape in the past 20 years. When visitors reach the exhibition platform, they can see a series of display panels showing the daily service of Highways Department and its projects that have become the landmarks of Hong Kong. Through this, the public could learn that our daily work is affecting their daily life. While pondering, one can see in the flowerbed behind the 20th anniversary logo formed by colourful flowers.

All these spaces are connected with trees, shrubs and flowers carefully arranged to create a cheerful and humane environment. Through the display, the public can know, and feel that their surrounding streetscape has been beautified incessantly. Simultaneously, you will find that our work echoes with the theme of the flower show 2006 ' Enchanting the beauty' of the City we serve.

Achievement of Environmental Objectives and Targets / Looking Ahead

“We recognize the importance of sustainable development and have been striving for continual improvement in the efficient use of resources by setting objectives and targets to improve our environmental performance.”



Achievement of Environmental Objectives and Targets

We set clear environmental management plans with yearly objectives and targets. We have made satisfactory progress in meeting the objectives and targets set for 2006. The achievements are summarized below:

Objectives	Targets set for 2006	Achievement (as at 31 Dec 2006)
Replacement of electromagnetic ballasts with a view to reducing energy consumption	To replace 1,000 electromagnetic ballasts by electronic ballasts for road lighting	1,500 electromagnetic ballasts were replaced
Increase recycled paper consumption in the Department	To increase the consumption rate of recycled paper from 85% (achievement in 2005) to 88%	88% of photocopying papers consumed were recycled papers
Greening measures for the relevant sections of the General Specification for Civil Engineering Works (GS)	To provide CEDD with specification clauses and follow-up advice on environmental protection measures for incorporation into the relevant sections of GS	Greening measures on environmental protection were incorporated into the new GS
To enhance landscape features of major highway projects	To plant 95,000 trees and 330,000 shrubs in the vicinity of major highway projects	About 120,000 trees and 1,000,000 shrubs were planted
Waste management (Castle Peak Road Improvement Project)	To reuse and recycle the existing wave wall blocks for new seawall construction and foreshore reinstatement respectively To recycle suitable excavated materials for backfilling works at abutments/retaining walls	About 2,000 m^3 of existing wave wall blocks were reused/ recycled About 45,000 m^3 of suitable excavated materials were recycled

Looking Ahead

We always strive for continual improvement. With the encouraging results achieved in 2006, we will continue in 2007 with more research initiatives and with greening measures in the enhancement of our environment.

Objectives	Targets
Implementation of Clean Air Charter initiative	To establish an Energy and Emission Management Team
Installation of electronic ballasts with a view to reducing energy consumption	To install 2,000 electronic ballasts for road lighting
Replacement of illuminated subway signs by non-illuminated retro-reflective subway signs with a view to reducing energy consumption	To replace 600 subway signs
Encouraging the use of recycled paper in the Department	To raise the percentage of recycled paper from 88% to 90% of the total consumption
Better control of electricity usage by office equipment and lighting in individual floors of Ho Man Tin Government Offices where the Departmental Headquarters are located	To install separate electricity meters in individual floors of Ho Man Tin Government Offices to monitor electricity usage
Developing low noise surfacing material	To commence a site trial to monitor the noise reduction performance of the new polymer modified bituminous material in expressway
Recycling materials	To commence a research study on the suitability and cost effectiveness of using rubber crumb from local scrap tyres in bituminous materials
Planting trees and shrubs	To plant 130,000 trees and 500,000 shrubs under major highway projects
Heritage preservation (Central Kowloon Route Project)	To commence an investigation study for Central Kowloon Route with particular attention to preservation of built heritage

We will make every endeavour to achieve the above targets and hope that this publication will provide you with a glimpse of our efforts in environmental protection. Should you have any comments or suggestions on our work, you are most welcome to share with us your views through our homepage on the Internet. (address: http://www.hyd.gov.hk)