

CARTOGRAPHIC ACTIVITIES
IN
HONG KONG, CHINA
2007 - 2011

Report for Submission to the 15th General Assembly of
the International Cartographic Association
held in Paris, France,
in July 2011

Prepared by the Survey and Mapping Office, Lands Department
The Government of the Hong Kong Special Administrative Region
The People's Republic of China

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A. INTRODUCTION

1. The Hong Kong Report

This report was prepared by the Survey and Mapping Office (SMO), Lands Department, the Government of the Hong Kong Special Administrative Region (Hong Kong SAR) of the People's Republic of China for submission to the 15th General Assembly of International Cartographic Association (ICA) and the 25th International Cartographic Conference (ICC) to be held in Paris, France on 3-8 July 2011.

The main purpose of this report aims at introducing the work carried out by SMO, including the production of paper maps and digital map data, provision of geographic information, and other survey and mapping services. It can also be regarded as a report on the cartographic and related activities taking place in Hong Kong broadly from 2007 to 2011.

2. Survey and Mapping Office, Lands Department

SMO of the Lands Department is the official land survey and mapping agency for Hong Kong SAR. It produces various types of maps and plans, carries out topographic surveys and land boundary surveys, establishes and maintains a territory-wide geodetic survey control network. Other major responsibilities of SMO include the provision of photogrammetric survey and reprographic services, maintenance of a computerised land information system for digital mapping and cadastral survey information, and administration of the Land Survey Ordinance of Hong Kong.

3. Participation in ICA

The Lands Department joined ICA in 1970s. Since then, SMO has continued to send delegates to attend the International Cartographic Conference and the General Assembly of the International Cartographic Association. SMO also exhibited its cartographic products in the ICC Map Exhibition and made effort to submit reports to the ICA General Assembly.

Two SMO delegates, namely the Deputy Director Mr. WONG Chung Hang and the Senior Cartographer Ms. Florence CHAN Wai Kum, attended ICC 2009 held in Santiago, Chile in November 2009, together with two other delegates from the Hong Kong Polytechnic University. SMO has displayed seven maps at ICC 2009 International Cartographic Exhibition. Being the Chairman and Secretary of ICA Hong Kong Committee, Mr. WONG and Ms. CHAN participated in the National Committee Meeting convened by the ICA Executive Committee held on 21 November 2009. ICA Hong Kong representatives took the view that more regional cartographic conferences should be organised to foster regional cooperation. SMO will continue to report the cartographic development in Hong Kong and help strengthen communication between member organisations.

The ICA Workshop on Theories of Map Design in Digital Era was held at the Hong Kong Polytechnic University with many advanced theories and experiences presented by renowned speakers on 23-24 September 2010. The workshop aimed at bringing together international survey and mapping practitioners to discuss various applications and researches using the state-of-the-art Geographic Information System (GIS) technology. The workshop also served as a good forum for closer international collaboration on cartographic and GIS development.

The Deputy Director Mr. WONG Chung Hang and Senior Cartographer Mr. LEUNG Kwok Hung will attend the 15th General Assembly of ICA and the 25th International Cartographic Conference to be held in Paris. The eight maps and publications displayed at the ICC 2011 International Cartographic Exhibition are the 1:50 000 Topographic Map, 1:10 000 Street Map, the Hong Kong and Pearl River Delta Satellite Image Map, the Hong Kong Island & Neighbouring Islands Countryside Map, the Hong Kong Helicopter Flying Chart (2 sheets), the Hong Kong Guide - the Gazetteer of Street and Place Names, the photo book "City under the Blue Sky - A Collection of Hong Kong Aerial Photos" and the map education leaflet "Understanding Maps".

B. MAPS PRODUCED BY SMO

1. Large Scale Basic Map

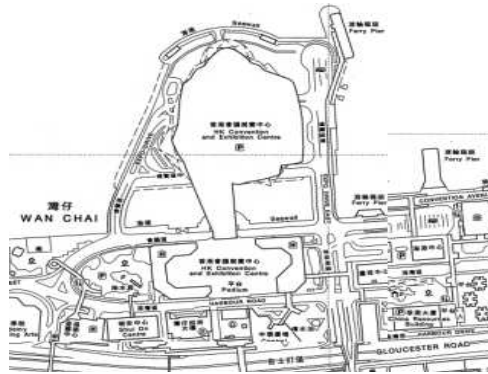
This is the largest scale topographic map with ground features surveyed and plotted to scale. This series consists of 3,257 sheets. It shows wealth of ground details with spot heights and 2m contour depicted where the information is required. The digital map data of the 1:1000 topographic maps are continuously updated by ground and photogrammetric surveys, and the hardcopies are published whenever the data is updated.



2. Medium Scale Derived Maps

(a) 1:5000 (Series: HP5C)

This series consists of 167 sheets which are compiled from the 1:1000 basic map series with details generalized and updated continuously from aerial photographs and field survey documents. Colour hardcopies are supplied as a print-on-demand service. Contours are shown at 10m interval.



(b) 1:10 000 Street Plan (Series: SM10C)

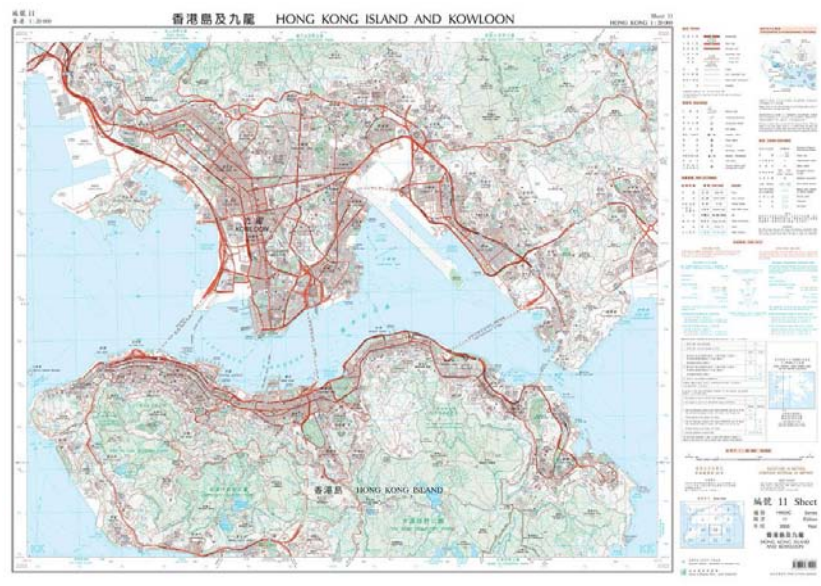
This is a street map series consisting of 59 regular sheets to cover the whole territory. It contains rich information of buildings, roads, and public facilities, with contours represented at 20m interval.



3. Topographic Maps

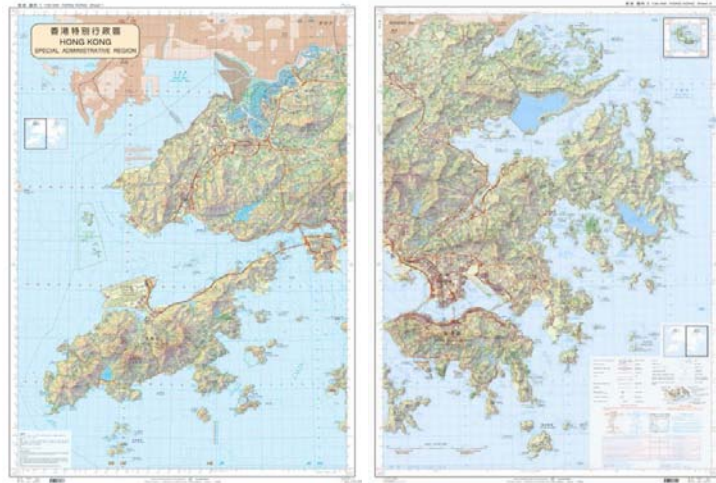
(a) 1:20 000 (Series: HM20C)

There are 16 sheets covering the whole territory and Sheet 1 is used as a title and legend sheet. Printed in colour and with contours depicted at 20m interval, this general purpose map series serves many purposes and is often used by schools in the teaching of map reading. Scouts and hikers also find this very suitable for use in hiking and orienteering activities.



(b) 1:50 000 (Series: HM50CL)

This set comprises of two sheets depicting the whole territory of Hong Kong. It is printed in colour with hill shading and layer tinting. Contours are at 50m interval. The two sheets can be joined together to form a wall map.



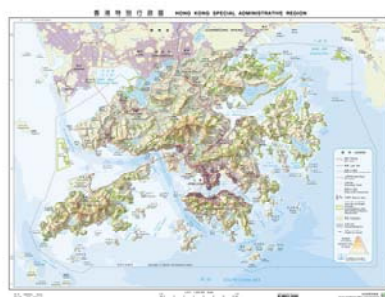
(c) 1:100 000 (Series: HM100CL)

This is a single sheet map printed in colour with hill shading and layer tinting. Contours are at 100m interval with supplementary contours at 50m level. It offers a general view of the topography of Hong Kong.



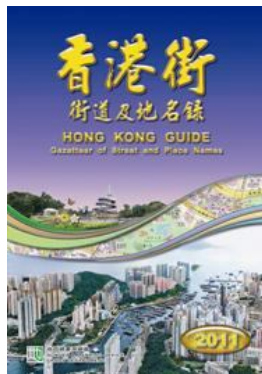
(d) 1:200 000 (Series: HM200CL)

This is a single sheet map printed in colour. It offers more generalised views of the major topography of the territory. It is a bilingual version and contours are at 100m interval.



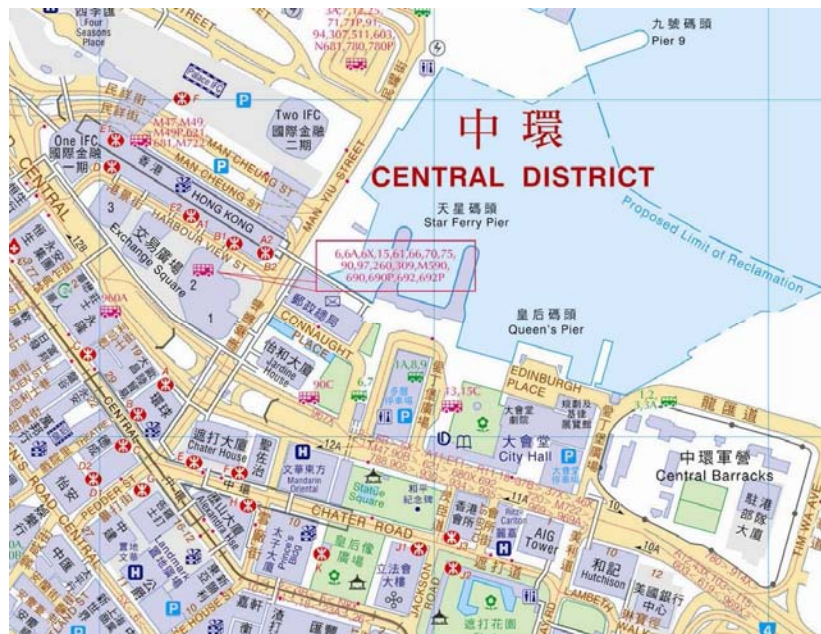
4. Street / Place Guides

Published annually, the “Hong Kong Guide” 2011 edition features public parks of Hong Kong, highlighting the design concepts and providing information of various facilities, memorials, galleries, and scenic views of many parks. The single volume publication has 432 pages of quality maps and valuable information. Indexes of “streets”, “places and villages”, “estates and building”, “schools”, “public services”, “leisure and cultural facilities”, and comprehensive public transportation enable readers to find their location easily. The Guide also contains many oblique aerial photographs showing newly built skyscrapers as well as the latest development of Hong Kong.



5. Urban Maps and Town Maps

Urban Maps and Town Maps are prepared to cover urban areas and new towns. They are printed in colour on both sides and are convenient street guides for general map users.



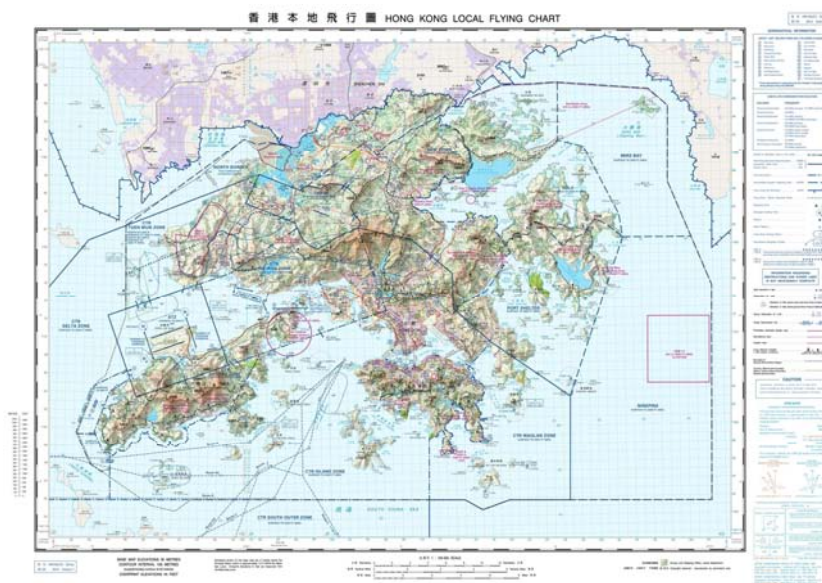
6. Countryside Maps

This is a series of footpath maps comprising five sheets. They are designed to assist hikers and nature lovers in exploring the rural countryside, especially the country park areas. They are printed in colour on both sides and folded.



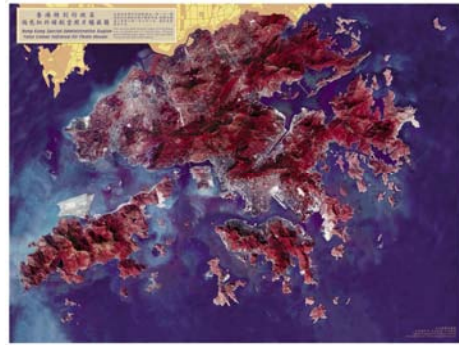
7. Flying Charts

Hong Kong Helicopter Flying Chart (HM50HFC) and Hong Kong Local Flying Chart (HM100LFC) are prepared at scale 1:50 000 in two sheets and at scale 1:100 000 in one single sheet respectively. They show the flight areas within the Hong Kong SAR. Aeronautical information is overprinted in red and blue on topographic maps. The overprint elevation is shown in feet. These charts are only available in English version.



8. Wall Maps

Two wall maps are produced by SMO. One is series HM50CL/J, a topographic map at scale 1:50 000 which covers the whole territory. The other wall map is a false colour infrared aerial photo mosaic of the whole territory at scale 1:60 000 approximately.



9. Aerial Photos

SMO undertakes colour aerial photography periodically at different altitudes. SMO also undertakes false colour infrared aerial photography and oblique aerial photography occasionally upon requests. Copies of these aerial photos in the form of duplicate and enlargement are obtainable on order.



10. Orthophoto Map

Orthophoto is derived from aerial photos of which image displacement caused by relief and camera tilts has been rectified. It maintains the pictorial information of the original aerial photos and is in uniform scale. The Orthophoto Map series (OPM50 and OPM100), are derived from Orthophotos. OPM50 is at scale 1:50 000 with addition of place names, while OPM100 is the plain version at scale 1:100 000. They are compiled from about 1,800 aerial photos taken between October & November 2008. The majority of aerial photos used are taken at a flying height of 2,400m and supplemented by aerial photos taken at 6,000m. Digital photogrammetric technology is employed at data processing, ortho-rectification and mosaicking.



11. Satellite Image Map

The Hong Kong and Pearl River Delta Satellite Image Map Series (PRDM 250S) is prepared by joining six Landsat-7 satellite images captured in December 2010. The map shows the name and location of administrative centres and settlements within the region.



12. Lot Index Plan

The Lot Index Plan shows the designation of lots and the approximate location of lot boundaries overlaid on basic map. The information shown on this plan must be verified by field survey and may be revised without prior notification as better or new boundary evidence becomes available.



C. DIGITAL MAPS SUPPLIED BY SMO

1. Digital Topographic Map

The Digital Topographic Map at 1:1000, 1:5000, 1:10 000 and 1:20 000 covering the whole territory of Hong Kong are available for sale to the public at the SMO Map Publications Centre, Hong Kong. Coordinates of the digital maps are in Hong Kong 1980 Grid, and heights are in metres above the Hong Kong Principal Datum.

2. Digital Orthophoto

Orthophoto is derived from aerial photos in which image displacement caused by relief and camera tilts has been rectified. Orthophoto maintains the pictorial information of the original aerial photos and has uniform scale. Users can use it for analysis, planning and presentation purposes. Digital Orthophoto DOP5000 series is produced from the aerial photos taken mainly at a flying height of 2,400m and supplemented by some taken at 3,600m, 6,000m and/or other flying heights as and when appropriate. Distortions of photographic images caused by tilting of aerial camera and relief are rectified except those of the building structures. True ortho-rectification has also been applied to elevated roads and bridges. DOP5000 series consists of 190 tiles covering all the land area of Hong Kong SAR. The ground pixel size is 0.5m x 0.5m. The image content of DOP5000 series will be updated annually.

3. Digital Aerial Photo

Digital Aerial Photos were produced from original aerial films (taken by SMO in Year 1963 and thereafter) by means of high-precision photogrammetric scanner at a resolution of 1,800dpi (dots per inch) or better. Digital Aerial

Photo is suitable for photogrammetric measurement. In purchasing the Digital Aerial Photo, relevant camera calibration report, if applicable would be provided correspondingly.

4. Geo-Community Database

GeoCommunity Database is a set of geo-coded community information embedded with spatial reference in textual database format. It contains a collection of location points of interest in the community, such as school, clinic, library, sports ground, convenient store, railway station access, etc, with comprehensive address information, contact details and other related service information. This Database can be used to carry out location search function for various facilities in a non-map based environment. Alternatively, it can also be used with other SMO's digital map bases for developing community-oriented GIS applications through the use of the geo-reference numbers.

D. GEOGRAPHIC INFORMATION SERVICE OF SMO

1. Geospatial Information Hub



“Geospatial Information” is an essential element for the effective administration of the government and the sustainable development of the community, for it forms the very foundation of government functions in the areas such as land administration, emergency relief, building works, public health, environmental protection, housing development, town planning, traffic and logistics, internal security, etc. Following the government’s implementation of the “E-government” policy, the integration and sharing of “Geospatial Information” have become more meaningful and necessary. Information sharing can help the Hong Kong SAR Government serve the community and drive the economy forward in a more effective manner.

On the basis of its expertise in the collection, collation, analysis, distribution and management of geospatial data, as well as its experience in the setting up and application of the geographic information system, SMO has spared no effort to break the information barrier. In this connection, SMO has set up this brand-new, user-friendly and clearly categorized “Geospatial Information Hub” through which the geospatial data and related information collated and collected from various departments can be effectively distributed and shared within the government. This platform provides the Hong Kong SAR Government with a common framework of state-of-the-art technologies and a wide coverage to further facilitate the circulation of internal data, so that various government departments can share the information more conveniently and effectively for enhancement of their work and services. The philosophy of SMO is to

maximize the potential value of information integration, and provide the government and the public with services of even better quality.

2. GeoInfo Map



A new government web map portal, GeoInfo Map, developed by SMO was launched on 26 May 2010 to support GovHK (www.gov.hk) government website, providing useful online geospatial information services to the public in an effective way.

GeoInfo Map allows users to search for locations and facilities in Hong Kong and obtain relevant geospatial information contributed by government departments. Users can toggle views using the online detail maps or photo maps provided by SMO.

Useful geospatial information available on the map portal includes mobile network coverage in country parks, locations of hiking trails, cycling tracks, barbecue sites, government offices, leisure, cultural and sports facilities, schools, libraries and hospitals, as well as geo-tagged photos.

The portal provides a variety of functions and tools to enhance the users' experience in map viewing and searching. With various search options and phrases to facilitate location search, GeoInfo Map helps users access different areas of interest easily. Users can use the intelligent search function by entering a search phrase in the search bar, such as "hotels in Central" or "museums in Tsim Sha Tsui", to location certain popular facilities in a specific area. Users can also plan their outdoor activities using GeoInfo Map which supports Global Positioning System (GPS) and Universal Transverse Mercator (UTM) coordinate searches.

GeoInfo Map service can be accessed directly at www.map.gov.hk or via GovHK at www.gov.hk/map.

E. OTHER SERVICES OF SMO

1. Boundary Survey

It refers to any survey which is required in connection with defining land boundaries in support of the government's land administration functions such as land valuation, land disposal, land alienation, land acquisition, land exchange, lease modification, lease enforcement, land management and so on. To facilitate land boundary survey, SMO maintains comprehensive land records containing information on land boundaries and previous surveys.

2. Geodetic Survey

SMO is responsible for maintaining and densifying a network of accurate survey control points that covers the whole territory of the Hong Kong SAR. This network provides the fundamental horizontal and vertical position reference for many vital activities, such as mapping, land boundary survey, land administration, building, infrastructure project, railway development, town planning, new town development, environmental protection, safety management of navigations in the air and the sea, and etc. SMO also provides geodetic survey services to other government departments.

3. Topographic Survey

Topographic survey is carried out by SMO. There are 3,257 sheets of basic maps of scale 1:1000 covering the whole of Hong Kong SAR. These maps are updated continuously by using aerial survey and ground measurement methods. To enhance efficiency, the updating work also makes use of the design information of the construction projects and the as-built drawings of the developed site.

4. Reprographic Services

SMO has been serving the government departments and the community for more than thirty years with provision of reprographic service for maps, plans, aerial photographs and in addition as a technical advisor on map reproduction methodology. With its advanced equipment, SMO is providing government departments with a wide of services such as digital photo taking, scanning, mounting and lamination, digital copying, producing poster, banner etc.

5. Digital Map Product Licences

The Internet Map Permittee (IMP) can make use of SMO's digital maps to develop applications for delivery of its map information services on its web site. IMP may also deliver the map information for use at other users' websites known as the Internet Map Redistribution User's web site. The IMP service is non-exclusive and subject to payment of relevant charges.

The Value-Added Reseller (VAR) service aims to open up the opportunities to business sector to develop various types of value-added map products using SMO's digital maps. The VAR service is non-exclusive and subject to payment of relevant charges.

6. Photogrammetric and Aerial Survey

SMO is mainly responsible for the acquisition and reproduction of aerial photos. Vertical aerial photos at various scales covering the whole territory are taken regularly. They are used for topographic mapping, emergency survey, land administration, planning and evidence gathering purposes. Oblique aerial photos are taken occasionally for project management and records of infrastructural development. SMO is also responsible for the production of territory-wide 3D spatial data of buildings, major infrastructure and terrain and provision of a centralized storage with the 3D Spatial Data Processing System.

F. MAP EDUCATION

1. Map Exhibition

SMO is active in taking part in various map exhibitions and cartographic activities in Hong Kong. Selected maps were displayed at the GIS Day 2007 held at the Wah Yan College in November 2007. More comprehensive introduction of SMO maps and services was exhibited on the two Geography Day 2008 and 2010 held at the University of Hong Kong and the Chinese University of Hong Kong in November 2008 and November 2010 respectively.

2. Education Leaflet

An “Understanding Maps” leaflet was produced by SMO in order to arouse the interest of children to learn about maps. Teachers and parents may use the leaflet as a teaching tool helping children to acquire some map-reading skills that will be useful for life.



G. RECENT DEVELOPMENT

1. Creation of 3D Spatial Data

In 1999, SMO began to build 3D spatial models for some areas in Hong Kong such as Lantau and Tseung Kwan O. Since then, SMO has applied the spatial analytical techniques to support various 3D spatial applications in other government departments. In 2007, SMO acquired a new computer system called 3D Spatial Data Processing System (3D SDPS) to create and maintain a territory-wide photo-realistic 3D spatial database containing more than 200,000 spatial objects, including buildings, roads and the natural terrain, with positional and height accuracy up to one-metre level. SMO 3D spatial data is also suitable for handling various kinds of spatial analysis such as visual impact assessment, inter-visibility study and airflow modelling on a territory-wide basis. An initial set of 3D spatial data covering the whole territory is now being regularly enhanced using various data sources including aerial photos taken by SMO.

SMO 3D spatial data is being widely used by government departments. Over the years, with the support of the survey staff seconded from SMO, works departments have used 3D models to create simulation models and animation videos to explain their engineering development proposals in the course of their public consultation.

2. Sharing 3D Spatial Data

To avoid duplication of efforts and to maximize the acquired resources, government departments with survey and mapping staff have been working very closely with SMO to promote the usage of the 3D spatial modelling technology. Under the directive of the Land and Engineering Survey Board, participating departments have joined together to devise a common data exchange standard for effective sharing of the 3D spatial data amongst government departments.



3D View of Victoria Harbour generated from the 3D Spatial Data of SMO

On completion of the whole data enhancement project in 2011, the data will be useful to land developers, town planners, architects and engineers in the private sector for project planning and implementation in Hong Kong SAR.

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