



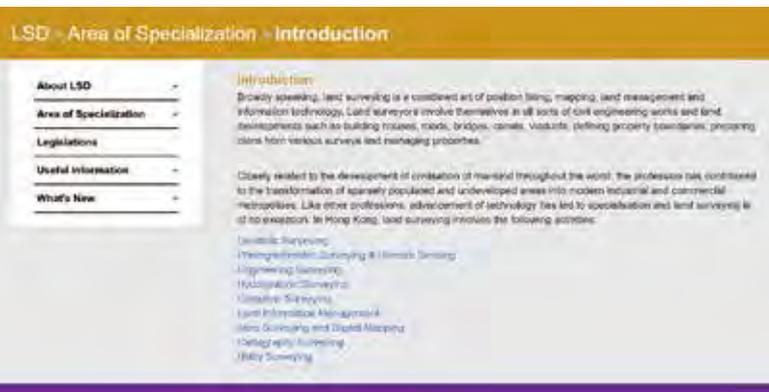
Land Surveying Division
Sr Koo Tak Ming LSD Council Chairman

Review of the Land Surveying Practice's Specialised Fields

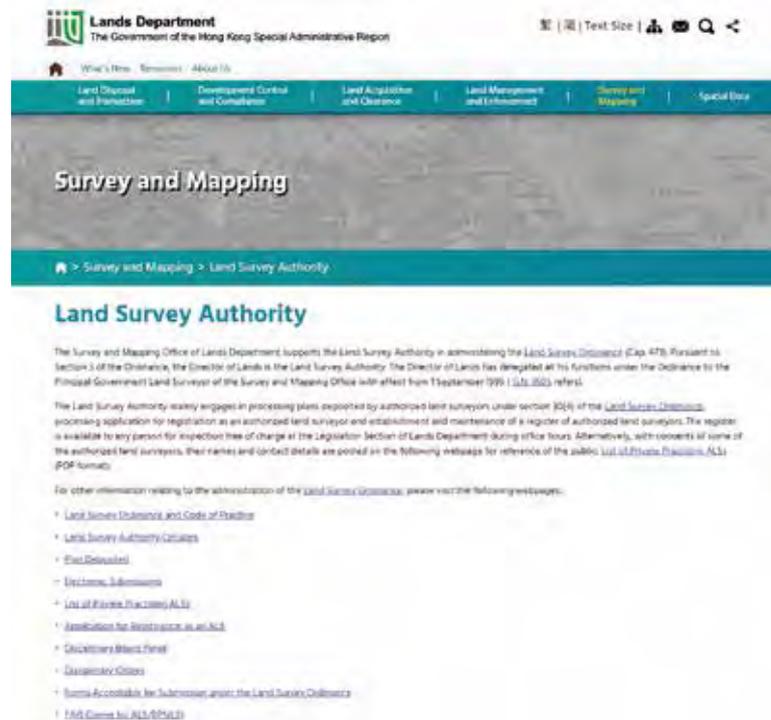
The LSD has defined the different fields of specialisation in Hong Kong's land surveying practice and adopted them as professional training fields for the APCs. While land surveying is largely driven by the technology-methodology-application cycle, land surveyors must be able to adapt to cycle elements changes. For instance, the invention of the laser scanner has changed the way land surveyors conduct mapping, as well as employ it for newer applications such as indoor mapping and scan-to-BIM operations. As a consequence, such innovative applications may motivate the invention or integration of even newer technologies such as SLAM and AI.

Revision to the Code of Practice under the Land Survey Ordinance (Cap 473)

The Code of Practice (COP) under the Land Survey Ordinance (LSO Cap 473) was first released in 1995, while its fourth edition came out in 2006. For the purpose of enhancing the practical instructions and guidance in respect of land boundary surveys and related matters, the Land Survey Authority (hereafter the Authority) now considers it opportune to update the provisions of the COP by issuing its fifth edition in accordance with Section 29 of the LSO.



A working group led by Sr Paul TSUI has been formed to review the specialised land surveying practices. It aims to complete the review by the end of 2021. Apart from proposing a categorisation that is more adaptable to the latest land surveying developments, the working group will also advise on the competency areas for each practice, so as to meet the needs of universities, professional trainers, and clients.



In July 2021, the Authority will conduct a briefing for HKIS members to highlight the fifth edition's major changes and benefits to Hong Kong.

Date of Briefing: 6:30pm, 20 July 2021
Venue: HKIS SLC and by Zoom
(Details of the briefing will be provided on the HKIS website.)

GNSS Heighting with a Precise Hong Kong Geoid model

With the support of the Innovation and Technology Commission (ITC) and the Government's Lands Department, the Department of Land Surveying and Geo-Informatics (LSGI) of the Hong Kong Polytechnic University developed a precise geoid model with 1 cm accuracy for Hong Kong. Prof CHEN Wu conducted a CPD on 17 June for members, during which he gave details of this new model and how it could benefit their work.



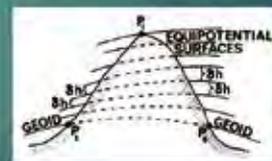
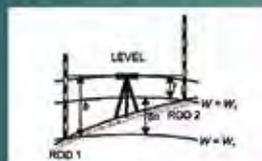
CPD Souvenir Presentation to Professor CHEN Wu



Q&A Session with Professor CHEN Wu on Live Broadcast

What Height difference we measured

- ▶ Measuring the distance between two equipotential surfaces
- ▶ Heights P measured from two side can be different
- ▶ Levelling loop may not be closed



Fundamental Differences in Height Measurements

Over 600 new gravity points were surveyed with an accuracy of $0.060 \times 10^{-5} \text{ms}^{-2}$. Combined with the existing 640 gravity points and over 70 GNSS/levelling points, Hong Kong's precise geoid model was based on two independent algorithms. An external evaluation showed that the accuracy of Hong Kong's geoid model was 1 cm, which allows it to support ordinary levelling within the city via the GNSS/levelling method. Currently, this geoid model has been implemented by the Lands Department's Hong Kong coordinate transformation service.

Prof Chen has been actively working on GNSS-related research for over 30 years. His main research interests are geodesy and geodynamics, seamless positioning

technologies, indoor positioning, navigation and integrity, GNSS positioning and applications, system integration, GNSS performance evaluation, regional GPS networks, wireless sensor network positioning, and airborne Lidar applications.

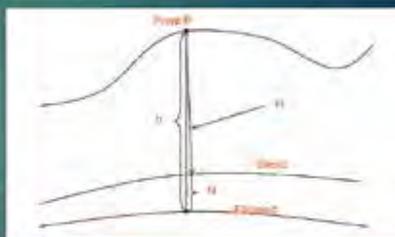
The LSD expresses its gratitude to the Lands Department for providing the coordinates transformation API service free to the public. This should greatly improve the surveying industry's efficiency.

Special thanks go to Prof Chen of PolyU for kindly allowing his newly-developed geoid model to be implemented by the coordinate transformation API service. The new model is a giant leap over expensive traditional levelling methods and already well-recognised by the surveying industry.

The LSD hopes that through the free geoid coordinated transformation service, more organisations will capitalise on its technological strengths to advance their business interests and extend these benefits to society.

GPS levelling

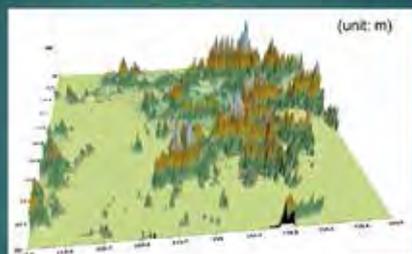
- ▶ Using GPS to establish vertical network
- ▶ $H = h - \Delta h$
- ▶ Accuracy:
 - ▶ GPS: cm to mm
 - ▶ Geoid: cm
 - ▶ Height: cm
- ▶ GPS levelling vs conventional levelling
 - ▶ GPS levelling: easy to obtain, but need precise geoid model
 - ▶ Conventional Levelling: higher accuracy with short distances



GNSS Levelling (by GPS) on Ellipsoid

Data Description

The Shuttle Radar Topographic Mission (SRTM3)



Digital Bathymetry Models - General Bathymetric Chart of the Ocean (GEBCO)

Combined Geoid Model Using Measurements on Land and Bathymetry Model on the Seabed

Determination of Final Geoid Model and Accuracy Evaluation

Final geoid model II

Internal precision of geoid model II



(The internal precision of geoid model II (unit: cm))

Altitude	1m	10m	100m	200m
Internal precision	0.04	0.20	0.40	0.70

Latest Geoid Model of Hong Kong Being Determined

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