



Hong Kong Vertical Control Network 2013

Questions and Answers

Q.1 Why do we need to form the Vertical Control Network 2013?

- A.1 The existing network has been used for decades and inherited errors due to different ground settlement, natural deterioration, human disturbance, land development and accumulation of measurement errors. About 1100 bench marks have been re-surveyed and adjusted to form the higher accuracy and homogenous **Vertical Control Network 2013** which facilitate users to measure heights and levels precisely at the whole Hong Kong Territory.

Q.2 What are the characteristics of the Vertical Control Network 2013?

- A.2 Height values of bench marks are updated in the **Vertical Control Network 2013**. Most values are different from the former values by few millimeters but some are different from the former values up to few centimeters. Although the height value is changed, the value still refers to the same bench mark on ground. To distinguish the difference, those bench marks in the new network are renamed to six integer digits with '2' as the first digit. For example, the former Bench Mark No.10743 is renamed to No.210001.

Q.3 Why do we need to update the height value of bench mark?

- A.3 The existing network has been used for decades and inherited errors due to different ground settlement, natural deterioration, human disturbance, land development and accumulation of measurement errors. Therefore, the height values of bench marks are updated in the **Vertical Control Network 2013** which is more accurate and homogenous than the existing network.

Q.4 How much is the change of height values for the bench mark?

A.4 Among 1100 bench marks, the change of height values smaller than 5 mm is 86%. Most of height values (about 66%) are only revised 1 mm or no change.

Q.5 How to know the change of height values for the bench mark?

A.5 By comparing the old and new height values of the bench mark from the old and new station summaries which can be obtained from the website of Lands Department at the link: www.geodetic.gov.hk.

Q.6 How to obtain the former height values of bench marks in the Vertical Control Network 2013?

A.6 First to obtain the station summary using the new name of bench mark from the website of Lands Department at the link: www.geodetic.gov.hk. Then the former name of the bench mark can be known from the station summary. Using the former name, the old station summary of bench mark can be obtained from the website.

Q.7 How accurate is the Vertical Control Network 2013?

A.7 From the least square adjustment report, 88% of height values of bench marks with accuracy better than 1 mm and 98% of height difference between adjoining bench marks are better than 1 mm.

Q.8 How accurate is the cross water levelling in the adjustment?

A.8 From the least square adjustment report, the accuracy and residual of the adjusted height difference for the cross water levelling among Tsing Lung Tau, Ma Wan and Lantau Island are better than 1 mm and 7 mm respectively.

Q.9 Does the Vertical Datum change?

A.9 The **Vertical Control Network 2013** is as same as the existing network that all levels and heights still refer to the Hong Kong Principal Datum.

Q.10 Which network should users choose?

A.10 There are about 1700 bench marks in the whole Hong Kong Territory. About 1100 bench marks are in the **Vertical Control Network 2013**. There are about 600 bench marks still in the existing old network. For the new project or high precision level survey, users are advised to adopt the accurate and homogenous **Vertical Control Network 2013**. We advise not to mix up the networks i.e. to conduct precise level survey from the **Vertical Control Network 2013** to the existing old network or vice versa. For the existing project, if the **Vertical Control Network 2013** exists, users can convert the old values to the new values or vice versa so as to bring the height values to the same network.

Q.11 How to handle the existing height records?

A.11 Some existing height records such as drainage records, engineering plans and height restriction plans showing levels or heights are based on the existing old network. Before using the height information, users should identify the survey origin of the information.

If the survey origin has new height values of the **Vertical Control Network 2013**, users should consider whether the change of old and new values is within their accuracy requirement. If positive and there is no change or settlement of ground features, they can continue to use the height information or to convert the old values to the new values so as to bring the height values to the **Vertical Control Network 2013**. If negative, users should consider whether re-survey using the **Vertical Control Network 2013** is required.

If the survey origin does not have new height values of the **Vertical Control Network 2013**, users can continue to use the existing height information if there is no change or settlement of ground features. However, the height information might not be consistent with the **Vertical Control Network 2013**. Therefore, users should consider whether re-survey using the **Vertical Control Network 2013** is required.

Q.12 What is the characteristic of Bedrock Benchmark?

A.12 63 Bedrock Benchmarks have been established in the bedrock over the territory. Three bedrock bench marks are installed in a group and about 10 km apart from each group. They are comparatively very stable and can last for years. They are adopted as the fundamental vertical reference points for maintenance of the Hong Kong Vertical Control Network.