

寶珊排水隧道 - 山泥傾瀉科技展學館

Po Shan Drainage Tunnel - Landslide Sci-Tech Chamber

寶珊排水隧道建於2009年，是最具標誌性的香港防治山泥傾瀉工程之一。透過有效地調控寶珊地段的地下水位，寶珊排水隧道這獨特設計能減低發生山泥傾瀉的風險。整個項目設計可靠，合乎成本效益，並具有可持續性，以防止類似1972年寶珊道山泥傾瀉的悲劇再次發生。

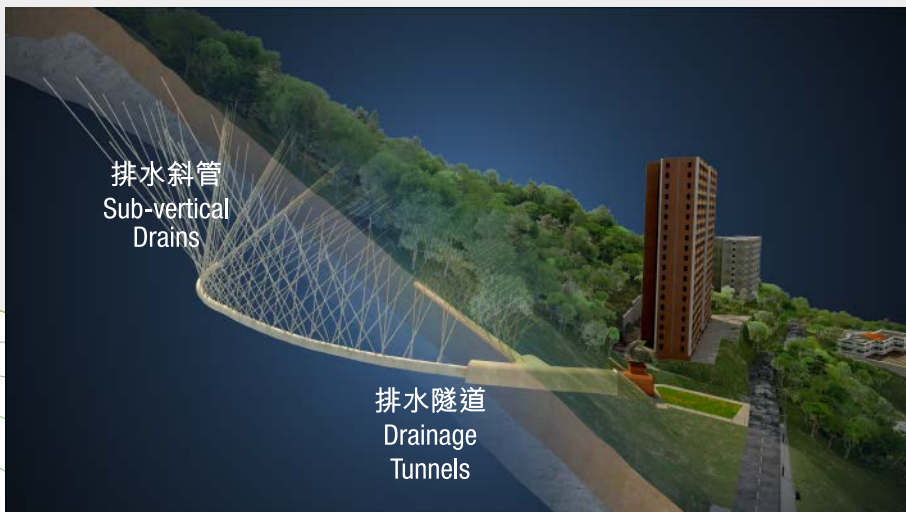
The **Po Shan Drainage Tunnel**, established in 2009, is one of the most iconic Landslip Prevention and Mitigation Works in Hong Kong. It was specially designed and constructed to reduce the risk of landslides at the Po Shan hillside by effectively regulating the groundwater level. It is a robust, sustainable and cost effective project which aims to prevent the recurrence of landslide tragedies similar to the Po Shan Road landslide in 1972.

1972年，半山寶珊道發生了災難性的山泥傾瀉，摧毀了許多家園及奪走了67人的生命。山泥傾瀉災難後的調查顯示，寶珊道的山坡受到高地下水位的影響，容易發生山泥傾瀉。

In 1972, the catastrophic landslide at Po Shan Road in the Mid-Levels shattered numerous homes and took away 67 lives. Post disaster investigation revealed that the Po Shan hillside was affected by high groundwater levels and was susceptible to landslide.

寶珊排水隧道包括兩條排水隧道（直徑為3.5米，總長度為500米）、172條排水斜管及自動實時地下水監測系統，以調控地下水位，從而減少重大山泥傾瀉的風險。

The Po Shan Drainage Tunnel comprises a pair of drainage tunnels (3.5m diameter and a total length of 500m), a network of 172 sub-vertical drains and an automatic real-time groundwater monitoring system to facilitate the control of the groundwater levels so as to reduce the risk of major landslides.





鑑於寶珊排水隧道的獨特性和創新技術，土木工程拓展署轄下的土力工程處在隧道內設立「山泥傾瀉科技展學館」以向公眾傳達斜坡安全的重要性。展學館內有四個不同主題的展覽廊，包括：

- i) **寶珊災難紀念廊** - 展示當年有關寶珊道山泥傾瀉事故的珍貴歷史圖片及記錄，以提醒我們山泥傾瀉災難所帶來的傷痛和教訓；
- ii) **氣候變化印象廊** - 提高市民對香港山泥傾瀉風險的意識，以及在極端天氣下為確保斜坡安全持續努力的重要性；
- iii) **山泥傾瀉知識廊** - 回顧香港過往百多年山泥傾瀉的歷史和香港斜坡安全系統的發展；及
- iv) **排水隧道體驗廊** - 透過應用「擴增實境」(Augmented Reality - AR)及排水斜管示範操作，介紹地下水位調控系統的創新技術。

在寶珊排水隧道—山泥傾瀉科技展學館內，我們將會帶你回顧1972年寶珊道山泥傾瀉災難和了解寶珊排水隧道中採用的創新技術；以及認識香港的山泥傾瀉歷史和為應對山泥傾瀉風險而設的斜坡安全系統。

Given the uniqueness of the Po Shan Drainage Tunnel and its novel features, the Geotechnical Engineering Office (GEO) of the Civil Engineering and Development Department (CEDD) established a **“Landslide Sci-Tech Chamber”** in the tunnel to convey the importance of slope safety to the public. In the Chamber, there are four galleries covering different themes, which include:

- i) **Po Shan Memorial Gallery** – presents precious historical photos and records about the landslide incident in Po Shan Road to commemorate the pain and reflect the lesson learnt of the disaster;
- ii) **Climate Change Impression Gallery** – raises public awareness of the landslide risk in Hong Kong and the importance of sustained effort to ensure slope safety under extreme weather;
- iii) **Landslide Wisdom Gallery** – exhibits the landslide history of Hong Kong over the past hundred years and the evolution of the Hong Kong Slope Safety System; and
- iv) **Drainage Tunnel Expression Gallery** – visualizes the innovations of the groundwater regulation system through Augmented Reality (AR) application and demo operation of the sub-vertical drains.

In **Po Shan Drainage Tunnel – Landslide Sci-Tech Chamber**, we will walk you through the catastrophic landslide at Po Shan Road in 1972 and innovative technology adopted in the Po Shan Drainage Tunnel project; the history of landslides in Hong Kong and introduce Slope Safety System established for combatting landslide risks.



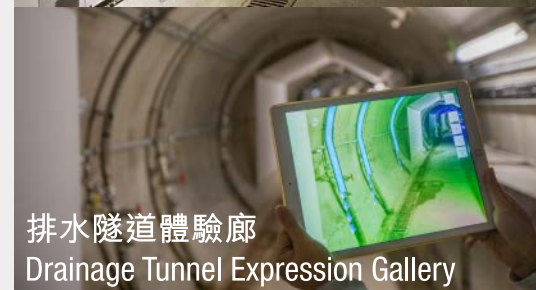
寶珊災難紀念廊
Po Shan Memorial Gallery



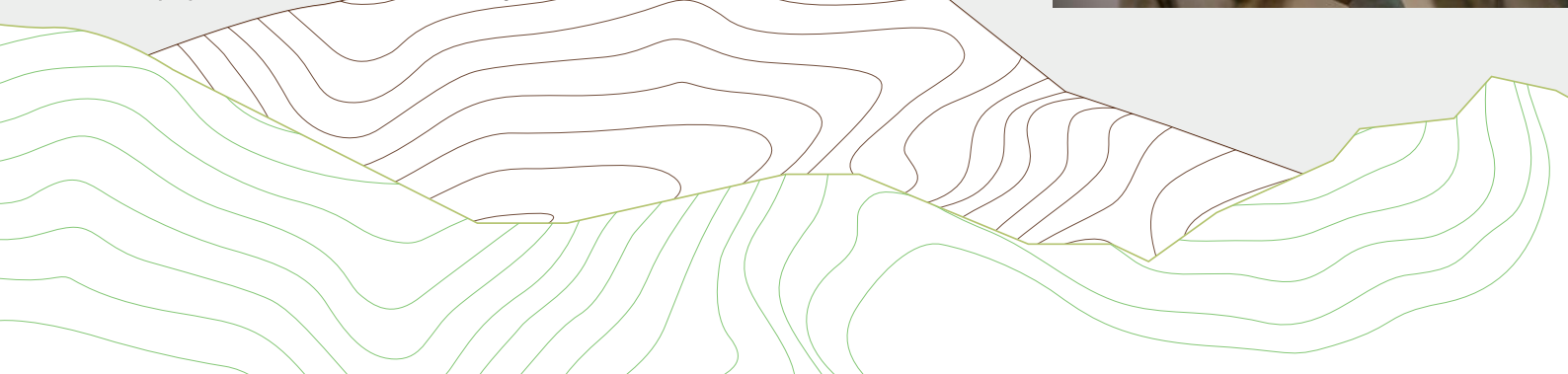
氣候變化印象廊
Climate Change Impression Gallery



山泥傾瀉知識廊
Landslide Wisdom Gallery



排水隧道體驗廊
Drainage Tunnel Expression Gallery



寶珊排水隧道—長遠防治工程項目資料

Po Shan Drainage Tunnel—Landslip Prevention and Mitigation Works Details

項目資料 Project Information

項目名稱 Project Title	半山區寶珊地段防治山泥傾瀉工程 Landslip Preventive Works at Po Shan, Mid-levels
工程部門 Works Department	土木工程拓展署 Civil Engineering and Development Department
工程範圍 Project Scope	為長期提升寶珊地段山坡穩定以防止各類型山泥傾瀉的發生 To improve the long term stability of the Po Shan area against various types of landslides
工程裨益 Engineering Merits	<ul style="list-style-type: none">為居住於寶珊地段的居民減少受山泥傾瀉影響的風險 Reducing the landslide risk for residents living in Po Shan Area全自動化水位監察及調控大大減少所需保養費用 Automatic groundwater monitoring and control minimize maintenance cost與香港天文台合作用作裝置高精度地震儀以探測世界各地地震並協助發出海嘯警告 Installation of a broadband seismograph station in collaboration with the Hong Kong Observatory for monitoring earthquakes worldwide and assisting issuance of tsunami warning for the local and international communities
工程費用 Project Cost	約一億六千五百萬港元 Around HK\$165million
完成日期 Completion Date	2009年12月 December 2009

工程項目概要 Summary of Construction Works

排水隧道
Drainage Tunnels

高位隧道
High Tunnel

低位隧道
Low Tunnel

排水斜管
Sub-vertical Drains

柔性防護網
Flexible Barriers

隧道入口斜坡泥釘工程
Soil Nailing Works at Tunnel Portal

鄰近天然山坡泥釘工程
Soil Nailing Works at Nearby Natural Slopes

詳細資料 Works Details

用鑽挖機建造
Constructed by Tunnel Boring Machine

直徑 Diameter - 3.5米 (m)
長度 Length - 305米 (m)

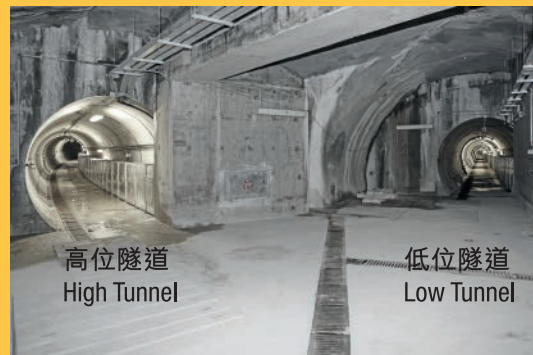
直徑 Diameter - 3.5米 (m)
長度 Length - 208米 (m)

172條, 24-100米長
(172 nos., 24-100m long)

120米長, 5米高, 防護能級
高達 3000千焦耳
120m long, 5m high with 3000kJ energy category

285條, 15-29.5米長
285 nos., 15-29.5m long

685條, 20米長
685 nos., 20m long



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Po Shan Drainage Tunnel -
Landslip Sci-Tech Chamber

創新技術 Innovative Features

- 採用水平定向鑽探的勘測技術，沿彎曲定線採集連續石芯樣本
Adopted the technique of Horizontal Directional Coring as a ground investigation tool to obtain continuous rock core samples along curved alignments
- 開挖隧道前完成從而得知地質環境
Completed before tunnel construction to know the geological condition



- 使用伸縮隧道鑽挖機
Adopted a retractable Tunnel Boring Machine (TBM)
- 不須建造回收豎井，從而大大減少對環境影響
Construction of receiving shaft was not needed, minimizing adverse impact to environment

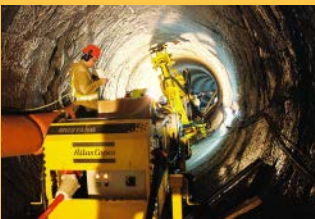


施工期間相片
Photograph taken during construction



擴增實境圖像
AR illustration

- 於狹小的隧道空間鑽挖和裝設長達100米的排水斜管
Sub-vertical drains drilled and installed up to 100m long within the small and congested tunnels



施工期間相片
Photograph taken during construction



擴增實境圖像
AR illustration

- 設立實時地下水自動監測系統
Established an automatic real-time groundwater monitoring system
- 使用自動壓力緩解系統控制地下水位於指定範圍內
Adopted automated pressure relief system to control the groundwater levels within a pre-defined range

