Applications of Latest Surveying Technologies in Major Road Works

最新測量技術在主要道路工程的應用

Highways Department

路政署

2012年1月5日

5 January 2012

Agenda
議程

- **Global Positioning System**

  全球衛星定位系統
- **Automatic Monitoring Survey System**

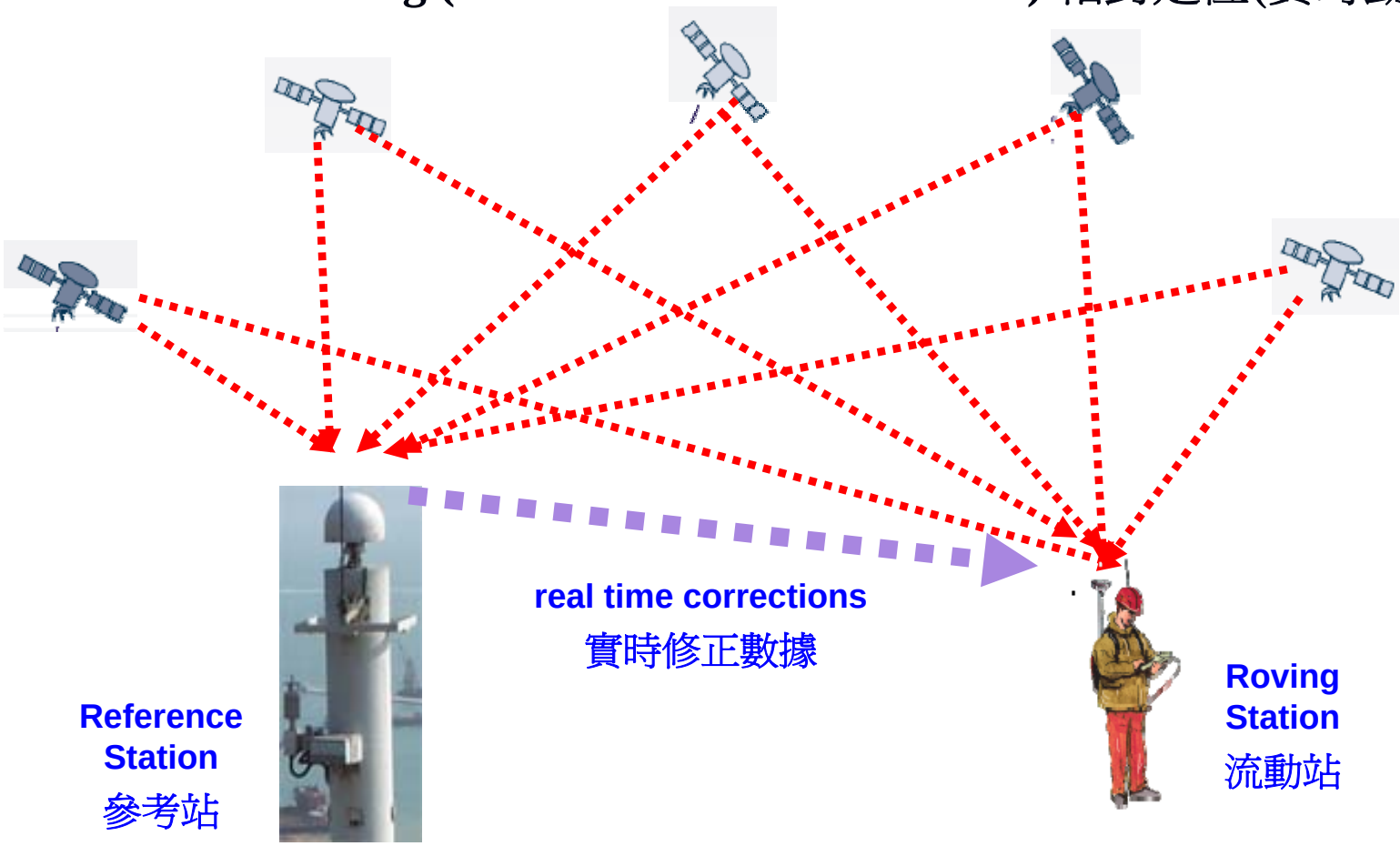
  自動測量監測系統
- **Three-dimensional Laser Scanning**

  三維激光掃描

Global Positioning System
全球衛星定位系統

GPS (1) – Background
全球衛星定位系統 (1) -背景

Relative Positioning (Real Time Kinematic Mode) 相對定位(實時動態模式)

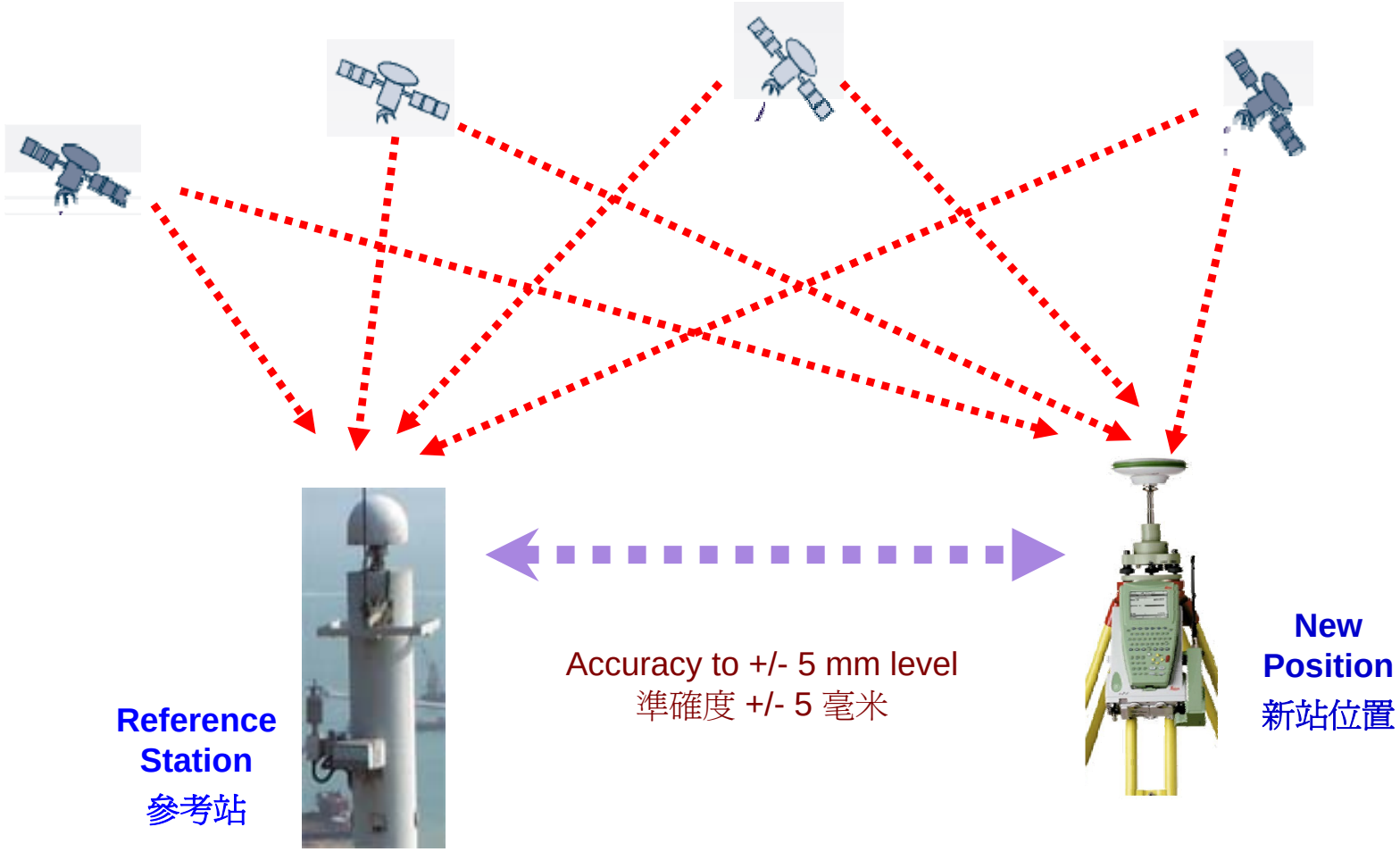


Accuracy to +/- 20mm horizontally, +/-60mm vertically

準確度可達+/- 20毫米(水平準確度),+/-60毫米(垂直準確度)

GPS (2) – Background
全球衛星定位系統 (2) -背景

Relative Positioning (Static Mode) 相對定位（靜態模式）

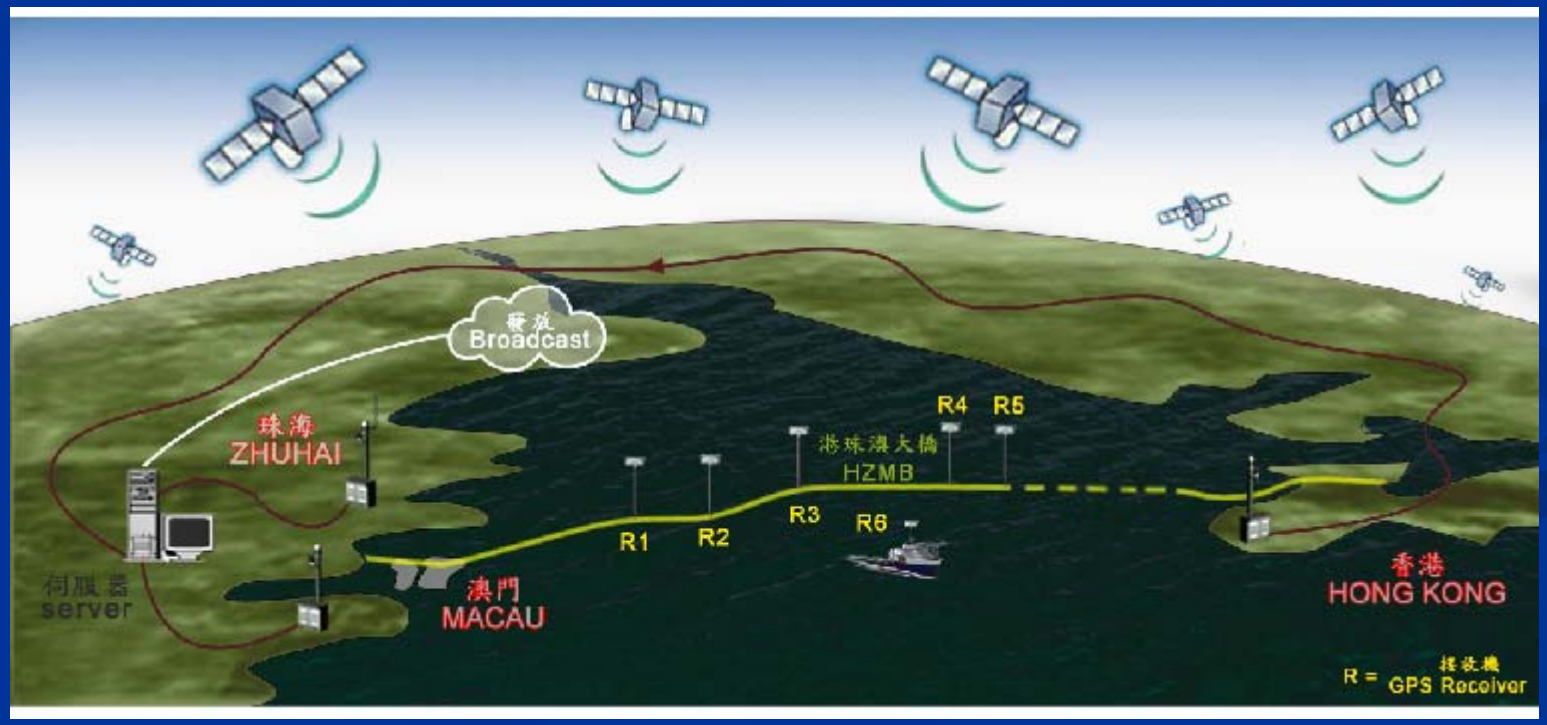


GPS (3) – Applications
全球衛星定位系統 (3) -應用

GPS (4) – Applications
全球衛星定位系統 (4) -應用
HZMB – CORS

港珠澳大橋---全球衛星定位系統連續運行參考站

- Continuously Operating Reference Station
- 連續運行參考站



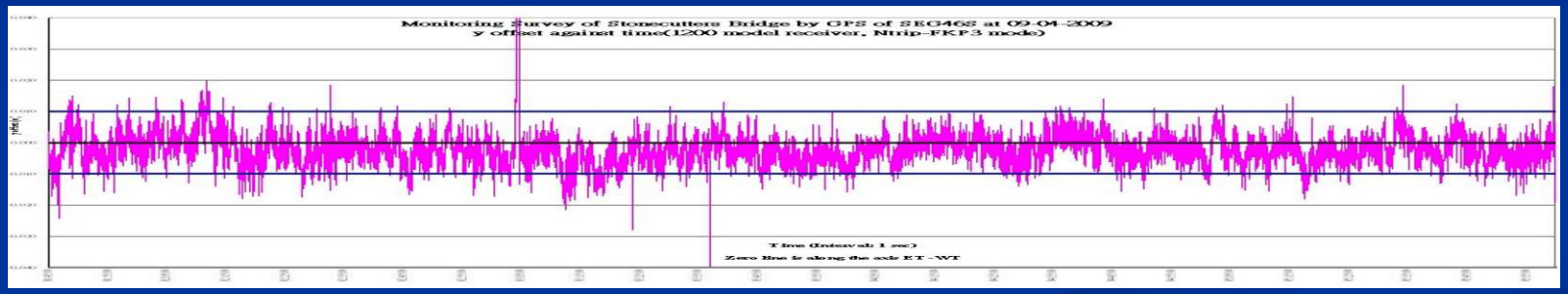
GPS (5) – Applications
全球衛星定位系統 (5) -應用

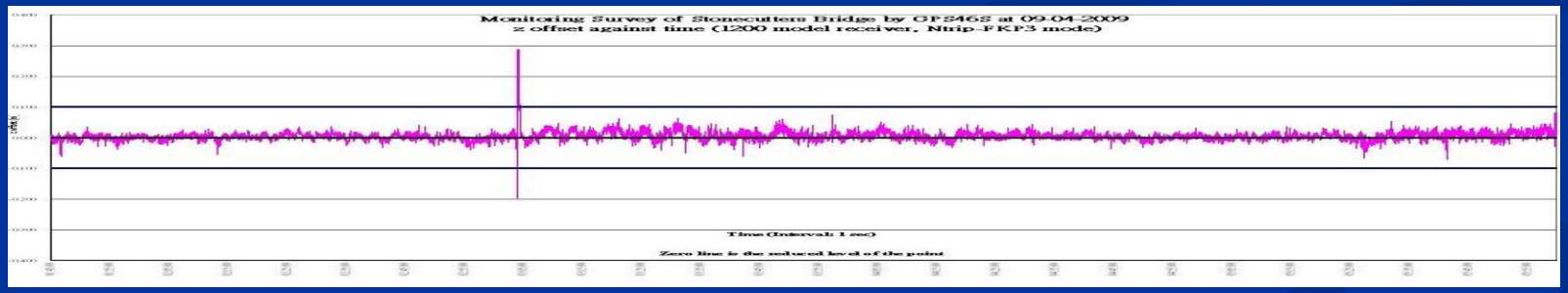
GPS (6) – Applications

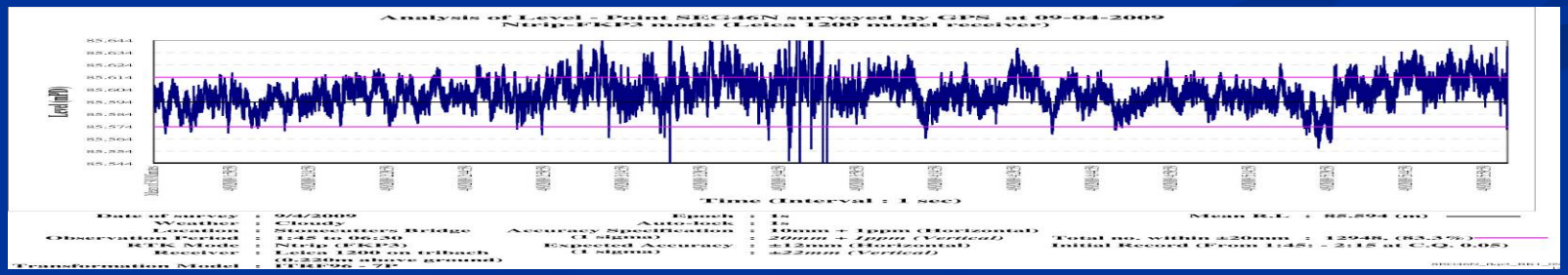
全球衛星定位系統 (6) -應用

Plot of lateral and vertical movements

橋樑橫向和垂直移動的實時數據







GPS (7) – Applications
全球衛星定位系統 (7) -應用

GPS (8) – Applications
全球衛星定位系統 (8) -應用

- GPS could also survey and collect asset information on street furniture

全球衛星定位系統可進行地形測量及收集街道設施的資產資料

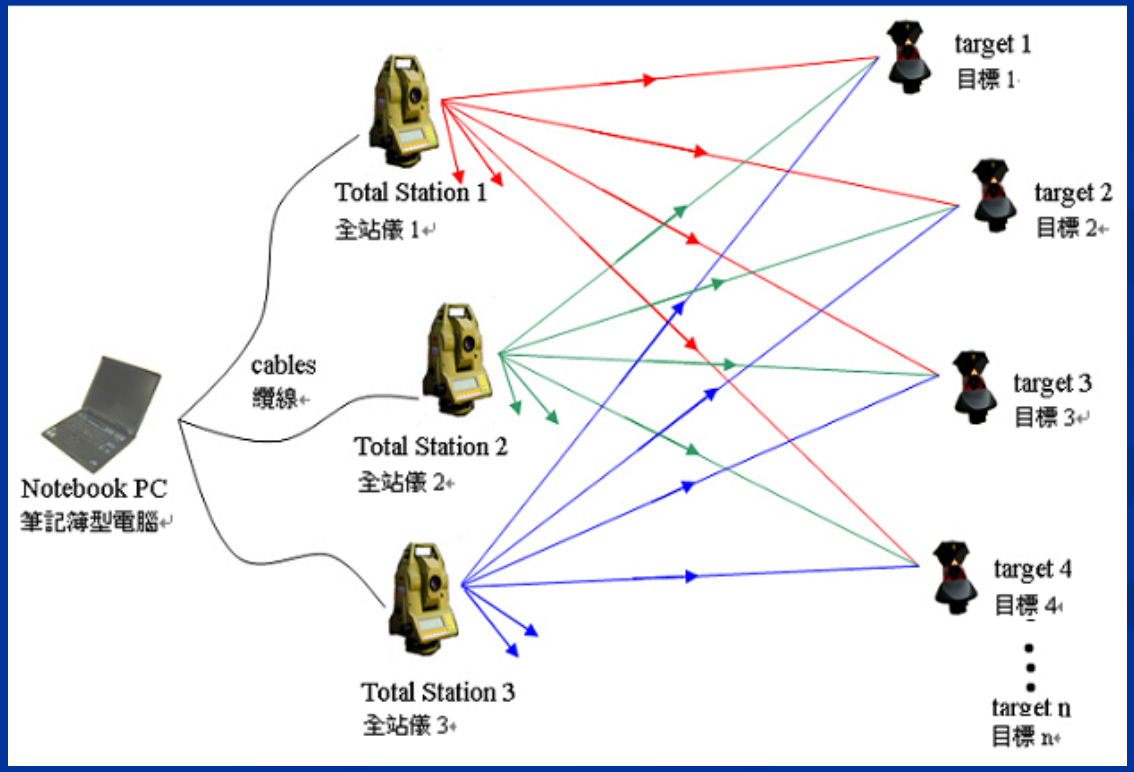
Automatic Monitoring Survey System

自動測量監測系統

AMSS (1) – Background
自動測量監測系統(1) -背景

- **AMSS** : A group of interrelated and interacting surveying and computing equipment forming an automatic system for monitoring works

自動測量監測系統是一組相互聯繫和相互作用的全站儀及電腦儀器，用作測量監測用途



AMSS (2) – Background
自動測量監測系統(2) -背景

Automatic Target Recognition (ATR)

自動目標辨認功能

AMSS (3) – Applications
自動測量監測系統(3) - 應用

Monitoring of retaining wall movement

監測護土牆的移動情況

Three-dimensional Laser Scanning

三維激光掃描

Laser Scanning (1) – Background
三維激光掃描(1) -背景

- **Laser scanning** is a contact-free measuring technique

  三維激光掃描是一種無須接觸物件的量度技術

- The scanner measures the travelling time of the light pulse to and back from the object

  激光掃描儀會計算光脈衝往返物件所需時間

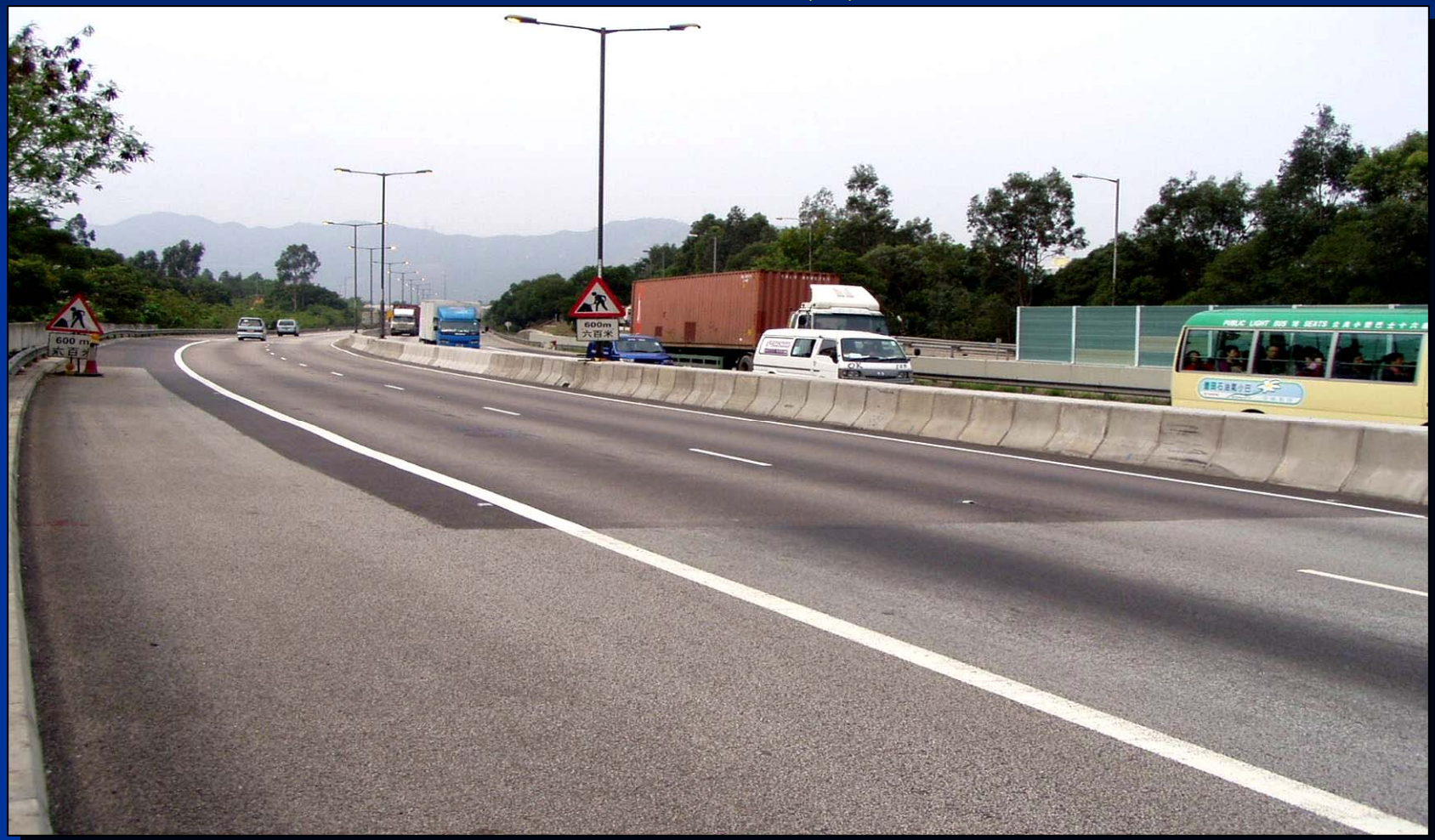
- A high density of points of the scanning object are collected

  激光掃描儀能收集物件的定位資料（高密度點，即密集點雲）

- Three-dimensional photo-textured model can be generated from the points

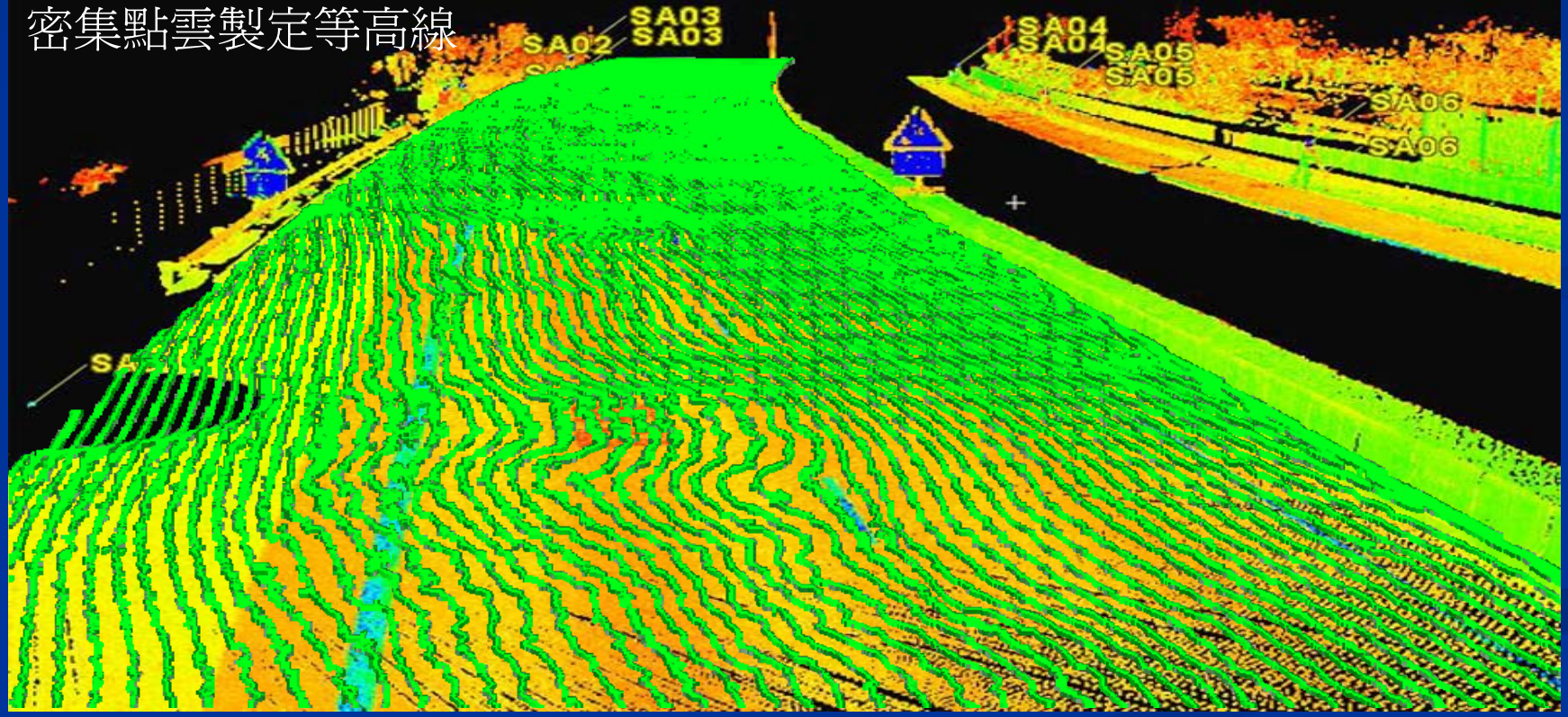
  密集點雲可產生照片材質三維模型

Laser Scanning (2) – Applications
三維激光掃描(2) - 應用



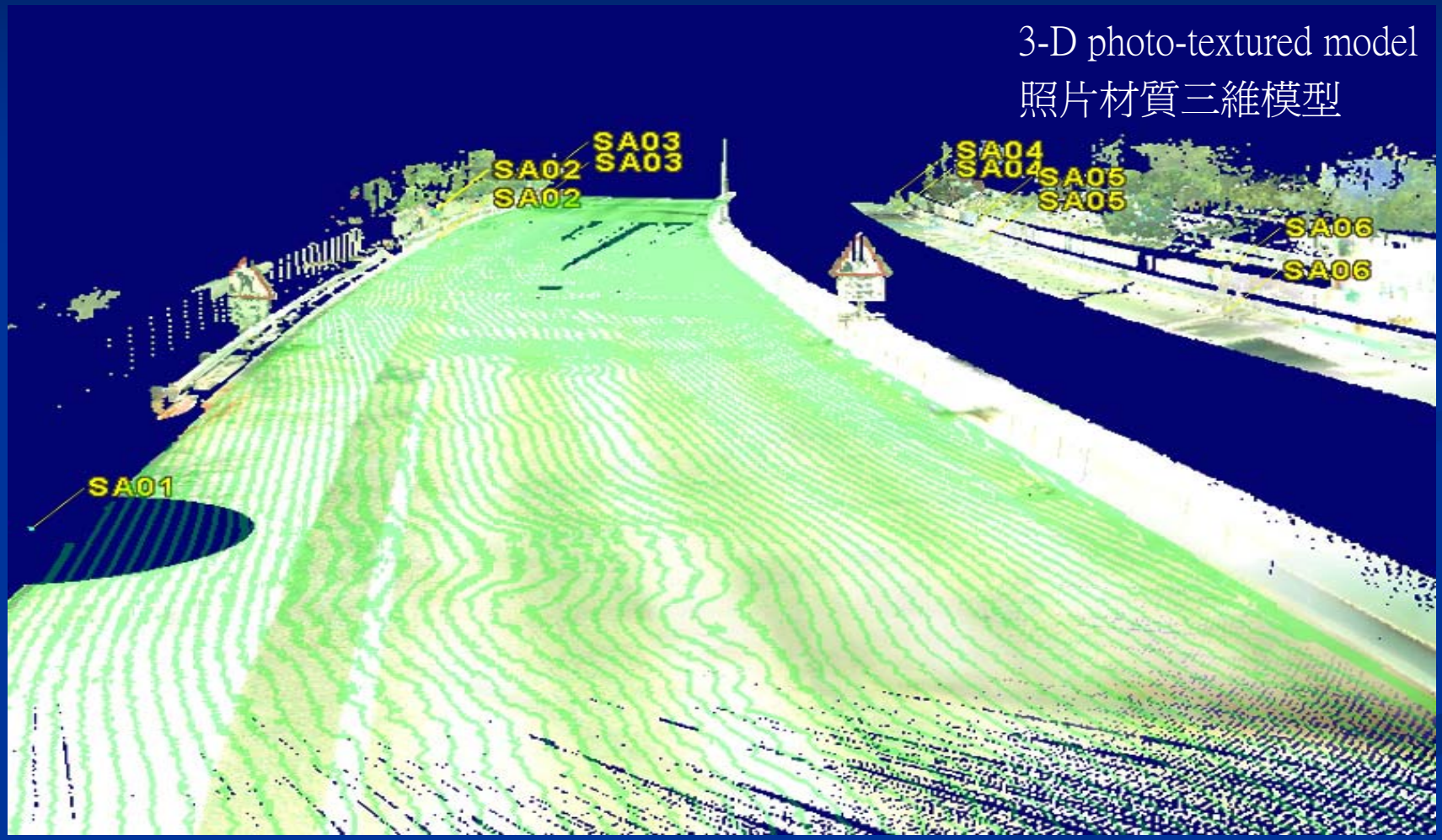
Laser Scanning (3) – Applications
三維激光掃描(3) - 應用

Contour lines generated
from laser point clouds
密集點雲製定等高線



Laser Scanning (4) – Applications
三維激光掃描(4) - 應用

3-D photo-textured model
照片材質三維模型



Laser Scanning (5) – Applications
三維激光掃描(5) - 應用

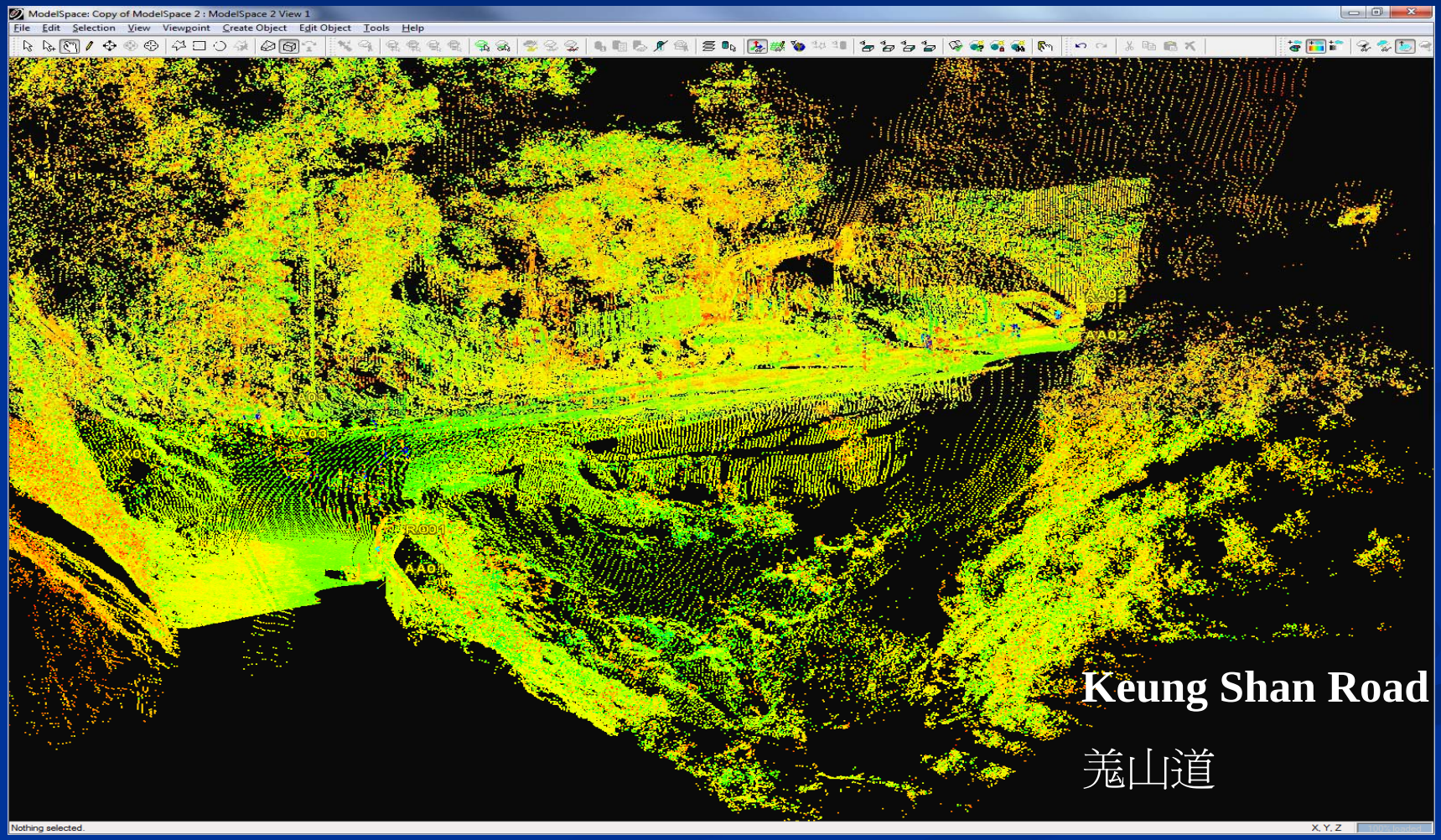
- Application on failed slopes and damaged roads

  應用於測量崩塌的斜坡和損毀的道路

- In June 2008, laser scanner was deployed to Lantau to measure the damage to the Keung Shan Road caused by the adjacent slope failure during heavy rains

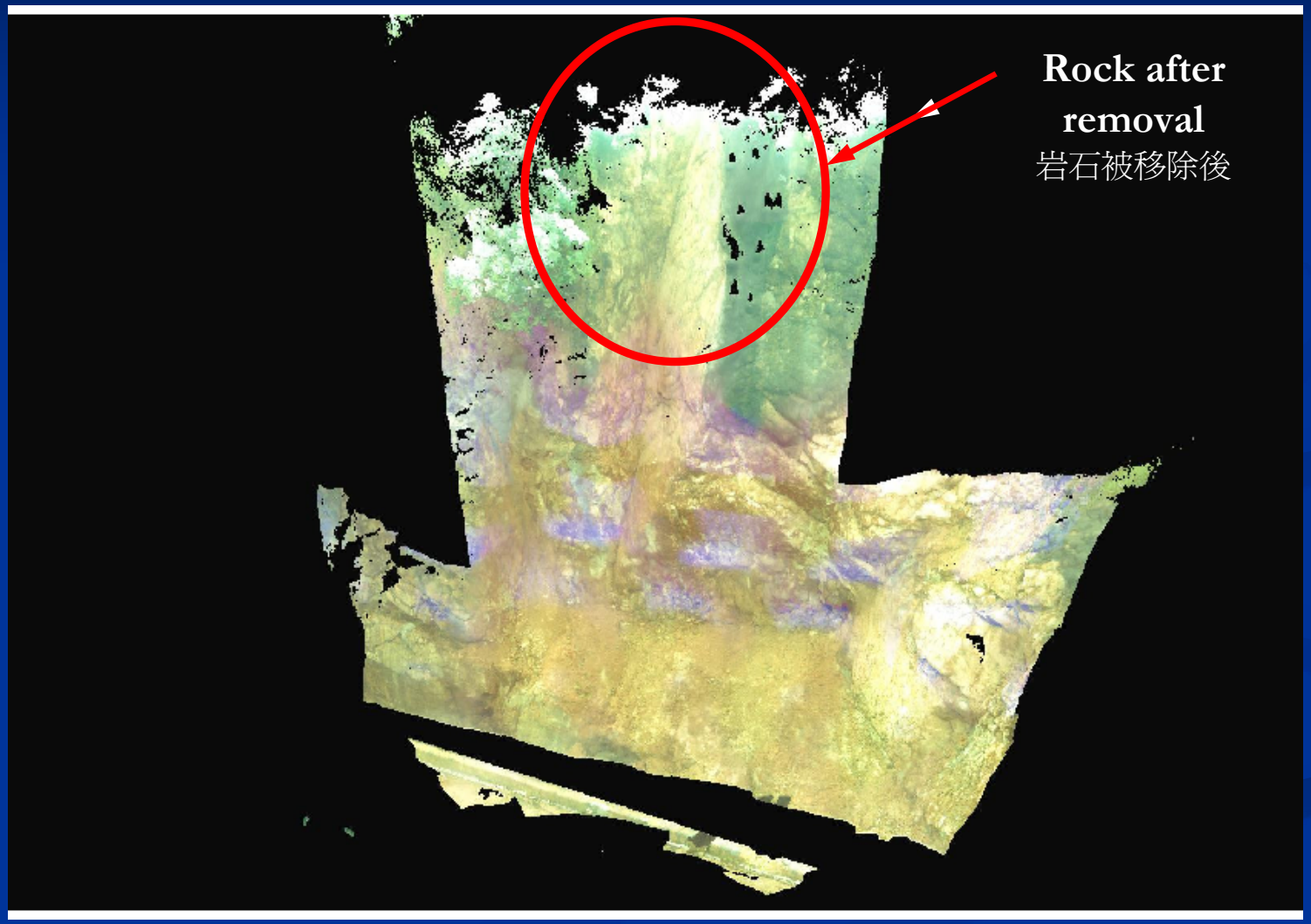
  在二零零八年六 月，署方把激光掃描儀運送到大嶼山，以量度羌山道毗鄰斜坡在暴雨下崩塌對該道路所造成的損毀

Laser Scanning (6) – Applications
三維激光掃描(6) - 應用



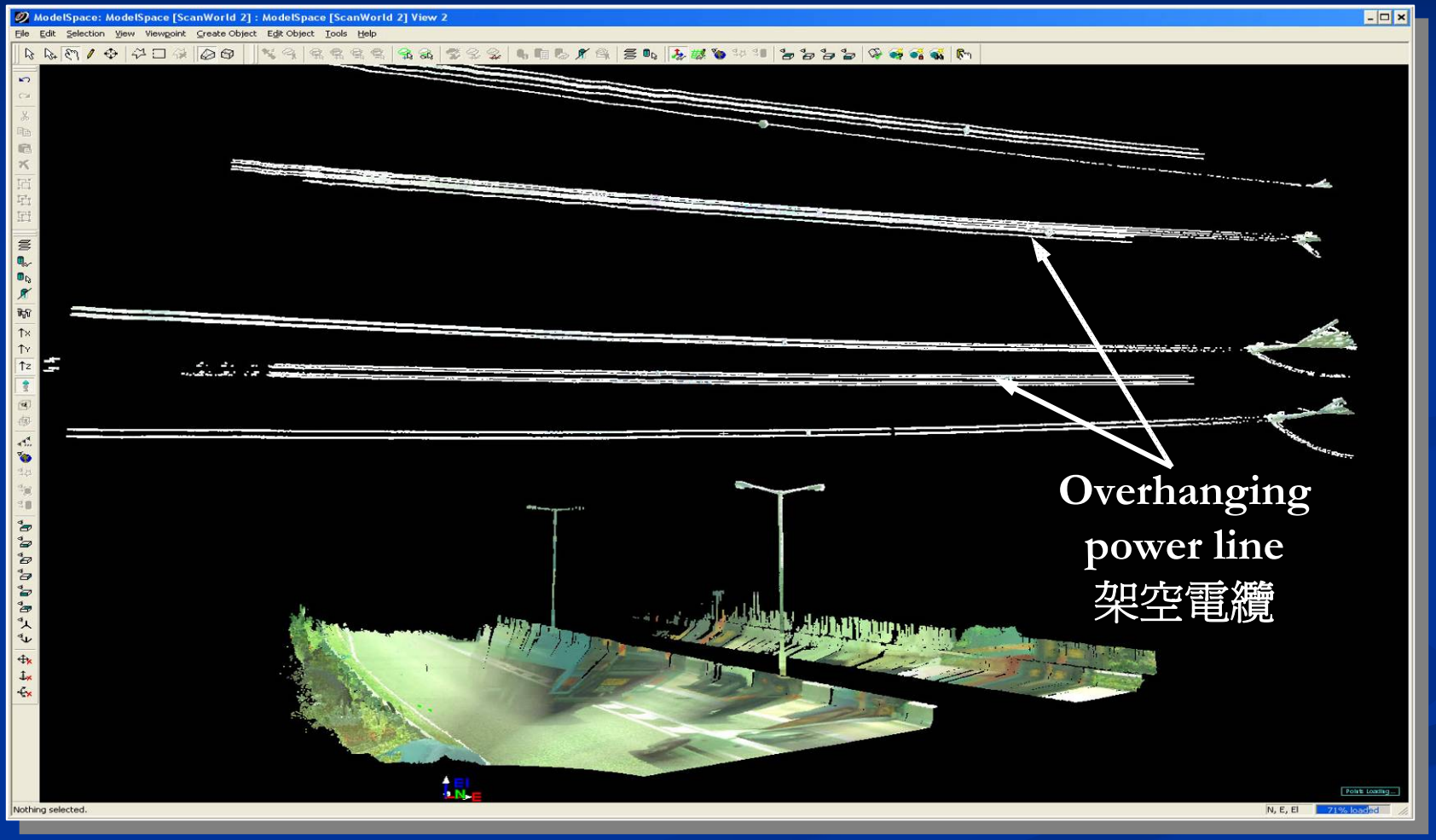
Laser Scanning (7) – Applications
三維激光掃描(7) - 應用

Laser Scanning (8) – Applications
三維激光掃描(8) - 應用



Laser Scanning (9) – Applications
三維激光掃描(9) - 應用

Laser Scanning (10) – Applications
三維激光掃描(10) - 應用



Thank You

謝謝!