Application of GIS Technology on slope registration for the prevention of landslide

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Hong Kong

- 1,100 Km^2 – Area
- 2,200mm – Annual average rainfall (80% between May and September)
- 200~300 Nos – Annual landslips

Civil Engineering and Development Department

- Implement and maintain high quality public works projects in Hong Kong
  - Oversee Slope Safety System
  - Implement 10-year Extended Landslip Preventive Measures Programme
  - Annual budget : US$ 115,000,000
  - Registered man-made slopes : 58,000

Substandard

Up-to-Standard

Slope Safety Division

- Oversee Slope Information System (SIS)

1. Slope field data, digital slope map, landslip incident, geology, ….
2. Slope Types (8 Nos.)

Survey Division

- Oversee Computerized Slope Registration and Location Plan (CSRLP) System
  - digital slope map
- Support Squatter Slope Information System
  - data analysis

CSRLP V1.0 (1996)

- 1970's :
  catalogue of slopes (paper)
- 1994 :
  field inspection, aerial photos, existing topographic plans

5 Main Functions (1996)

1. Slope Registration – unique slope no.
   (e.g. 11NE-A/FR88)
2. Plan Production – interactive/batch
3. Data Retrieval – sheet no./slope no./slope type/extent of area
4. System Administration – access authority/backup
5. Network Administration

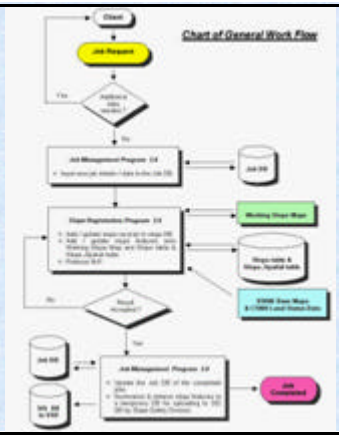
CSRLP	V1.0 1996
Hardware	
Server	P100 Dual CPU 64 MB 9 GB HD
Workstation	P100 Single CPU 32 MB 1 GB HD
Peripherals	A0 digitizer
Backup	4GB 4mm tape drive
UPS	10 minutes
Software	- NT Networking and operating system - NT MicroStation - NT Geographics - NT Oracle 7 RDBMS
Link to SIS	T1

Areas for Improvement

- 8 slope types or more ?
- Adjacent slope affected during modification ?
- Job progress ?

CSRLP (V2.0) (2006)

1. Spatial Data Object – Oracle / Single entity (graphic + text)
2. Interface Programme – VBA
3. Data Quality Checking
4. Add-on land status – land ownership / maintenance responsibility
5. Job Monitoring – trace job progress



Squatter Slope Information System (2002)

- 1980's – 75,000 people
- 2003 – 9,600 people

Components

1. Non Development Clearance Area
2. Cadastral Information
3. Base Map Information
4. Slope Boundary Information

Data Analysis

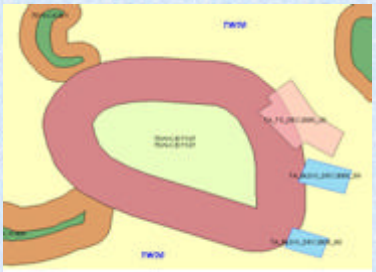


Fig. 11

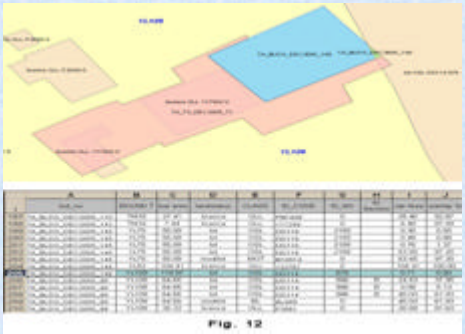


Fig. 12

Way Forward

1. Information sharing
2. Efficient data management
3. Slope modification history

Thank You

CEDD

Cutting

Filling

Cutting&Filling Cutting&Retaining

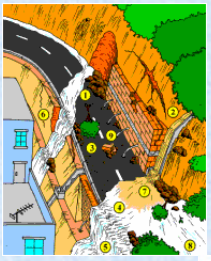
1,100 Km^2

57,000 Registered Slopes in Hong Kong

1,100Km^2 , 7 Million

Present day Hong Kong (Intense development on hillsides)

Slope near building



Slope near highway

Landslip

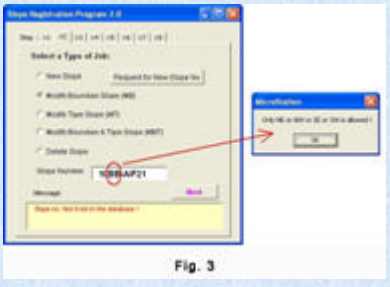
Landslip

1972 landslip

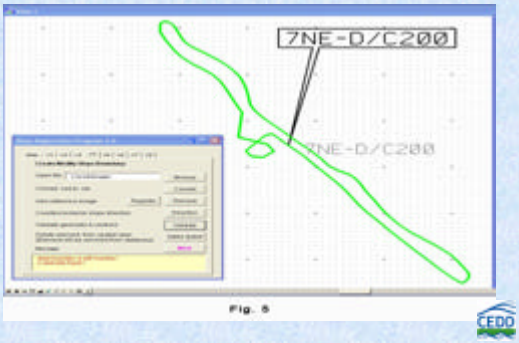
- 67 fatalities

Slope Registration Plate

Interface Programme



Dangling Node



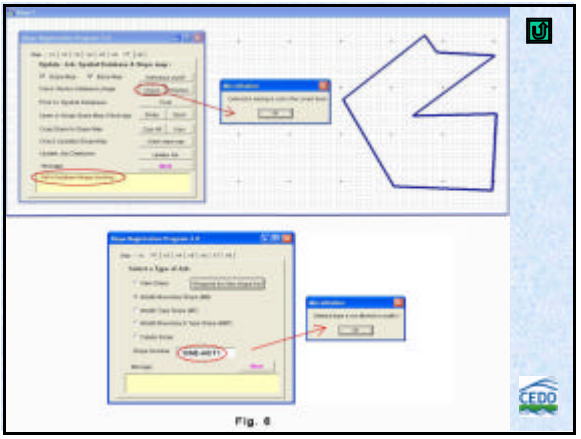


Fig. 6

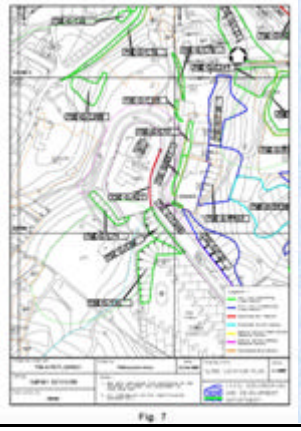
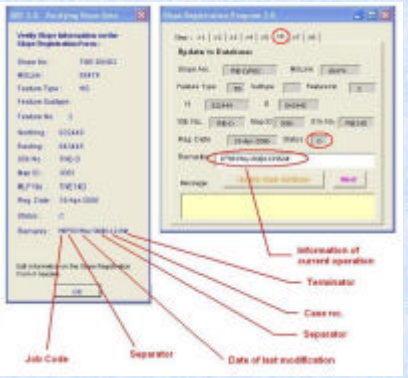


Fig. 7

Fig. 8 Fig. 9



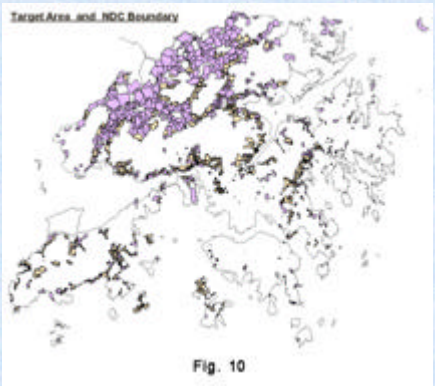


Fig. 10

Base Map Information

Cadastral Information

Slope Boundaries

Job Progress