Blasting related failures

K F Man
Mines Division, CEDD
3 March 2007

Definition of explosives

- Explosives – capable by chemical reaction in itself of producing gas
  - at such a temperature and pressure
  - and at such a speed
  - as could cause damage to surroundings.

- 1 kg of explosive expands to 700 to 1,000 litres of gas in milliseconds and releases up to 3,000 to 5,000 kJ (1 kg gasoline releases about 48,000 kJ)

- Velocity of detonation (VOD) of 2,000 to 7,500 m/sec.

Use of explosives in Hong Kong

- Rock blasting
- Entertainment (fireworks display, film making, stage show)
- Life saving
- Ammunition and industrial use
- Demolition blasting

Average consumption of explosives in Hong Kong
(year ending 2006)

- About 1,960 tonnes/yr in past 5 years (average 6.5 tonnes per day)

- About 2,100 nos. of blast per year (average 7 nos. per day)

Rock blasting

Entertainment -fireworks display

- 2 ~ 3 time per year
- Time : 20:00 to 20:23
- Venue ： Victoria Harbour

- Daily
- Time : 19:00, 20:00 or 21:00
- Venue ： Hong Kong Disneyland

Fireworks used / confiscated in Hong Kong

Aerial shells

Fire crackers

Fire crackers

Cracking ball

Life saving

Marine Distress signal

Airbags

Seat belt pre-tensioner

Ammunition

Industrial use

Safety cartridges for industrial fastening tools

Smoke generators

Fire extinguisher actuators

Demolition blasting (Lok On Pai Dewatering Plant)

Legislations in the control of explosives

Cap. 295 - To ensure safety and security on the use of explosives (Category 1 dangerous goods) in Hong Kong

Authority : Commissioner of Mines (Director of Civil Engineering and Development) for regulatory control of use of explosives on land

Duties : undertaken by the Mines Division CEDD

Dangerous Goods Ordinance Cap. 295

- Dangerous Goods (Application and Exemption) Regulations
- Dangerous Goods (General) Regulations
- Dangerous Goods (Government Explosives Depots) Regulations
- Dangerous Goods (Shipping) Regulations

Licences and Permits

- Licence to Store
- Permit to Use
- Licence to Manufacture
- Removal Permit (Transport)
- Mine Blasting Certificate (Shotfirer)

(issued under Cap.285)

Explosives for rock blasting

Detonators

Primers

Cartridge explosives

Detonating cords

Explosives manufactured on site

Mobile manufacturing unit

Bulk emulsion

Ammonium Nitrate prills

Bulk ANFO

Ammonium Nitrate Fuel Oil (ANFO)

AN Prill → $3NH_4NO_3$ + CH_2 ← **Diesel fuel**

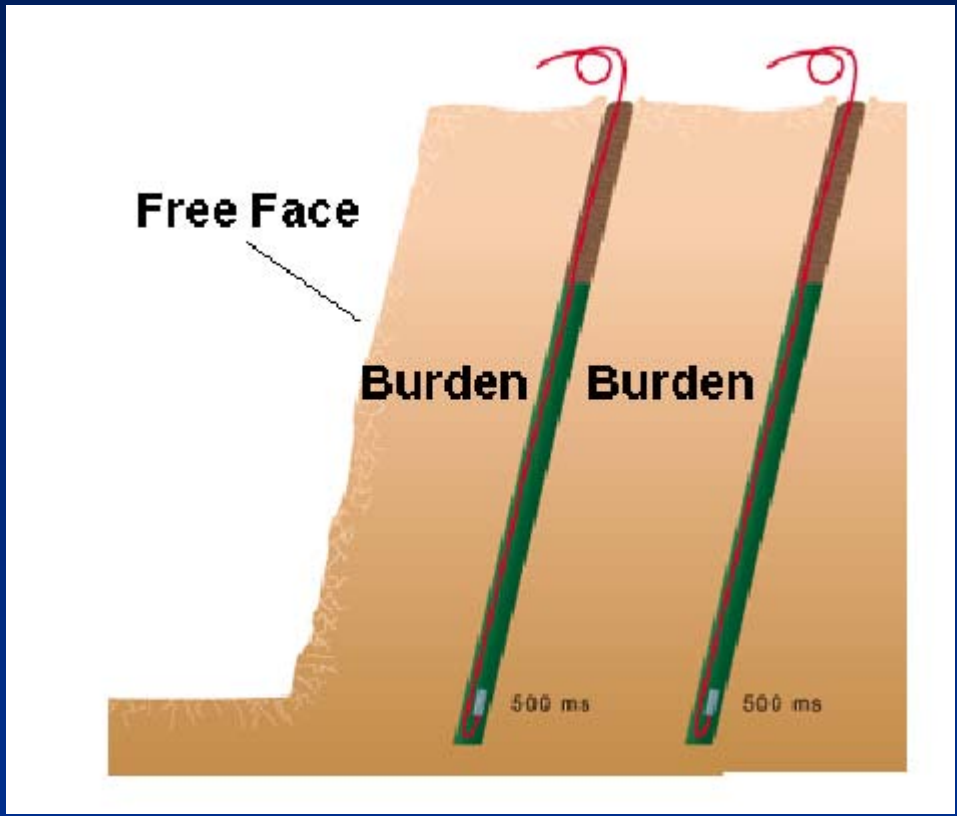
Two seperate non explosive components mixed together to form an explosive

Use of explosives in blasting work

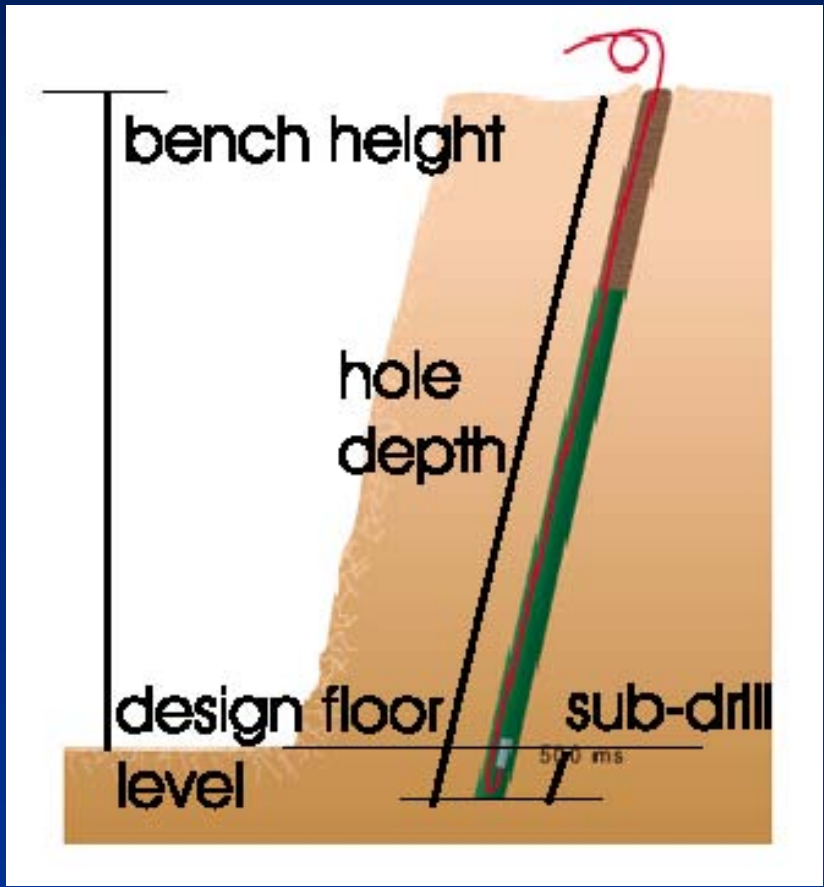
- Site formation
- Quarrying
- Tunneling

Bench blasting - Blasting parameters

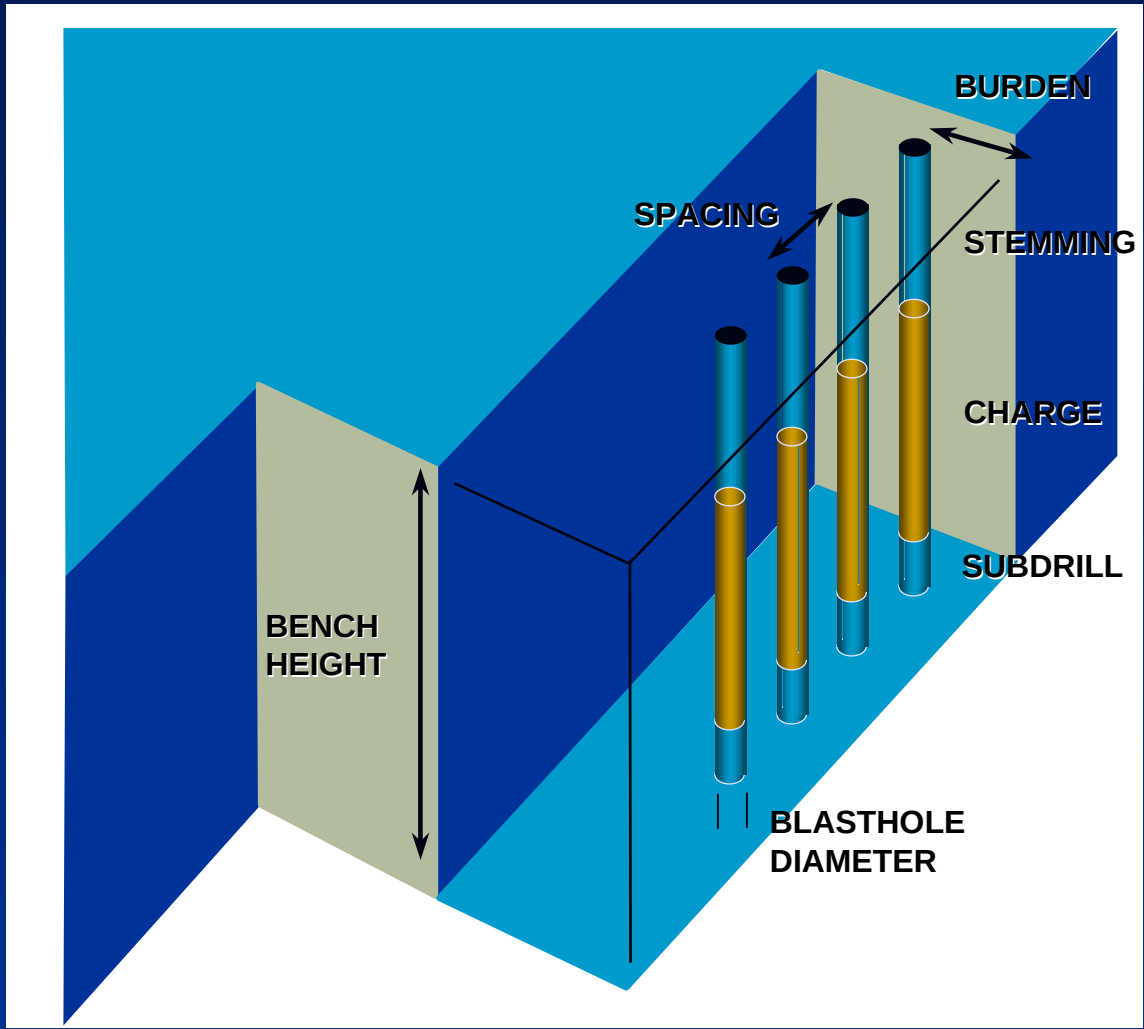
- Burden - the distance between two rows of holes



- **Spacing - the distance between holes in the same row**
- **Drill depth - the depth to which the pattern needs to be drilled**
- **Subdrill - depth added into the drill depth below grade level**



Blast Parameters



Bench blasting

Procedures for bench blasting

1. Blast Design
2. Marking Out
3. Drilling
4. Hole Measurement
5. Protective Measures
6. Priming
7. Loading
8. Stemming
9. Connecting
10. All clear
11. Firing the Shot
12. Misfires
13. Housekeeping

Blast cages sand vertical screens

Blast cages and vertical screens

Inserting detonator into booster





Loading detonator and booster into blast hole

Loading bulk ANFO from mixing truck

Loading bulk emulsion into blast hole

Loading stemming into blast hole

Preparing surface connection

Completed surface connection

Warning gongs

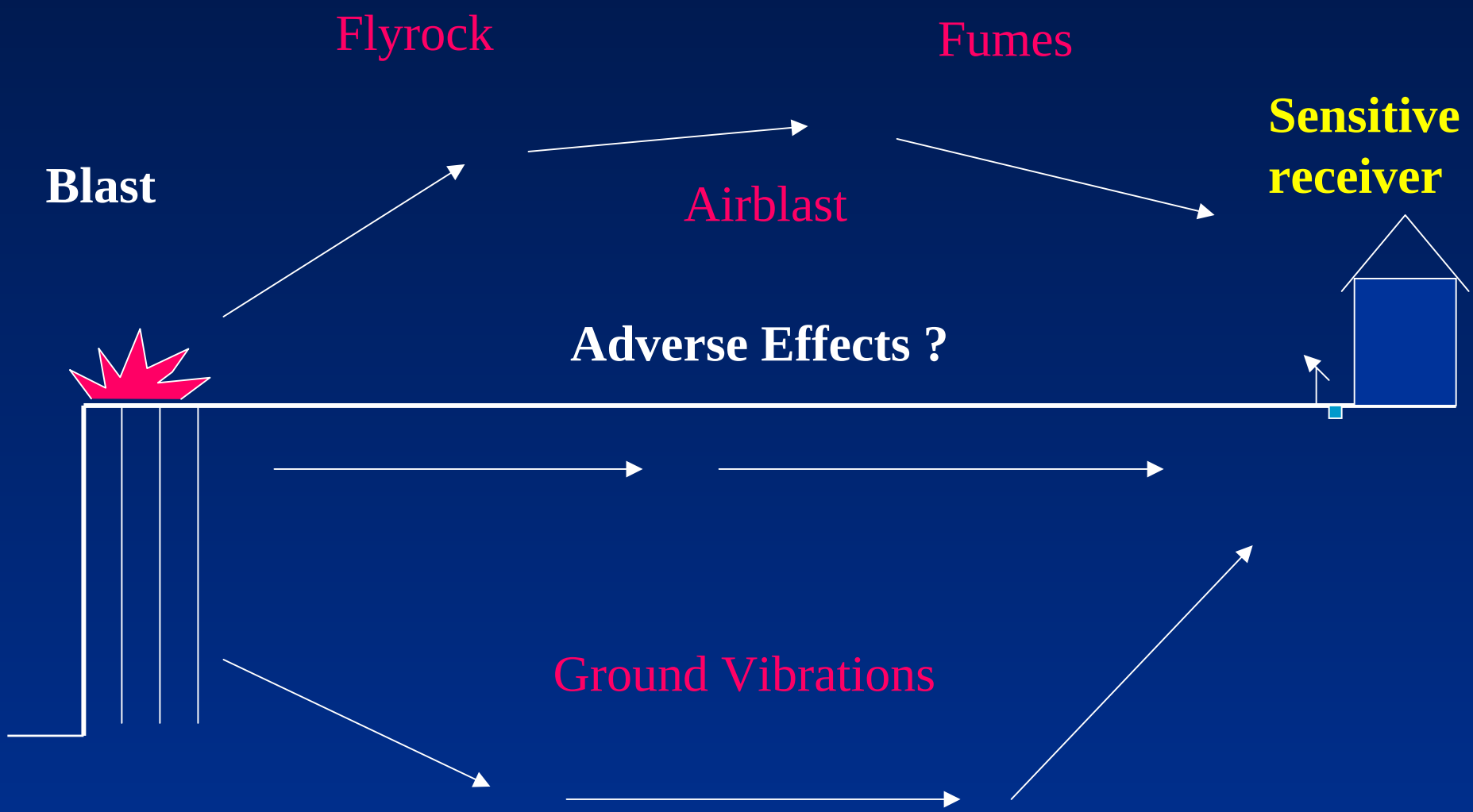
- For a period lasting from 5 minutes prior to the blasting until all charges have been fired, warning gongs shall be beaten continuously…

Temporary road closure

Vibration monitoring

Video for blasting
Good #1

Video for blasting
Bad #1


Flyrock
Fumes
Sensitive receiver
Blast
Airblast
Adverse Effects ?
Ground Vibrations

Case No. 1

399 Yip Kan Street, Wong Chuk Hang

12 July 1981

Ref. S R Hencher (1981). Report on Slope Failure at Yip Kan Street (11SW-D/C86) Aberdeen on 12th July 1981. GCO Report No. 16/81.

Yip Kan Street, Wong Chuk Hang Site

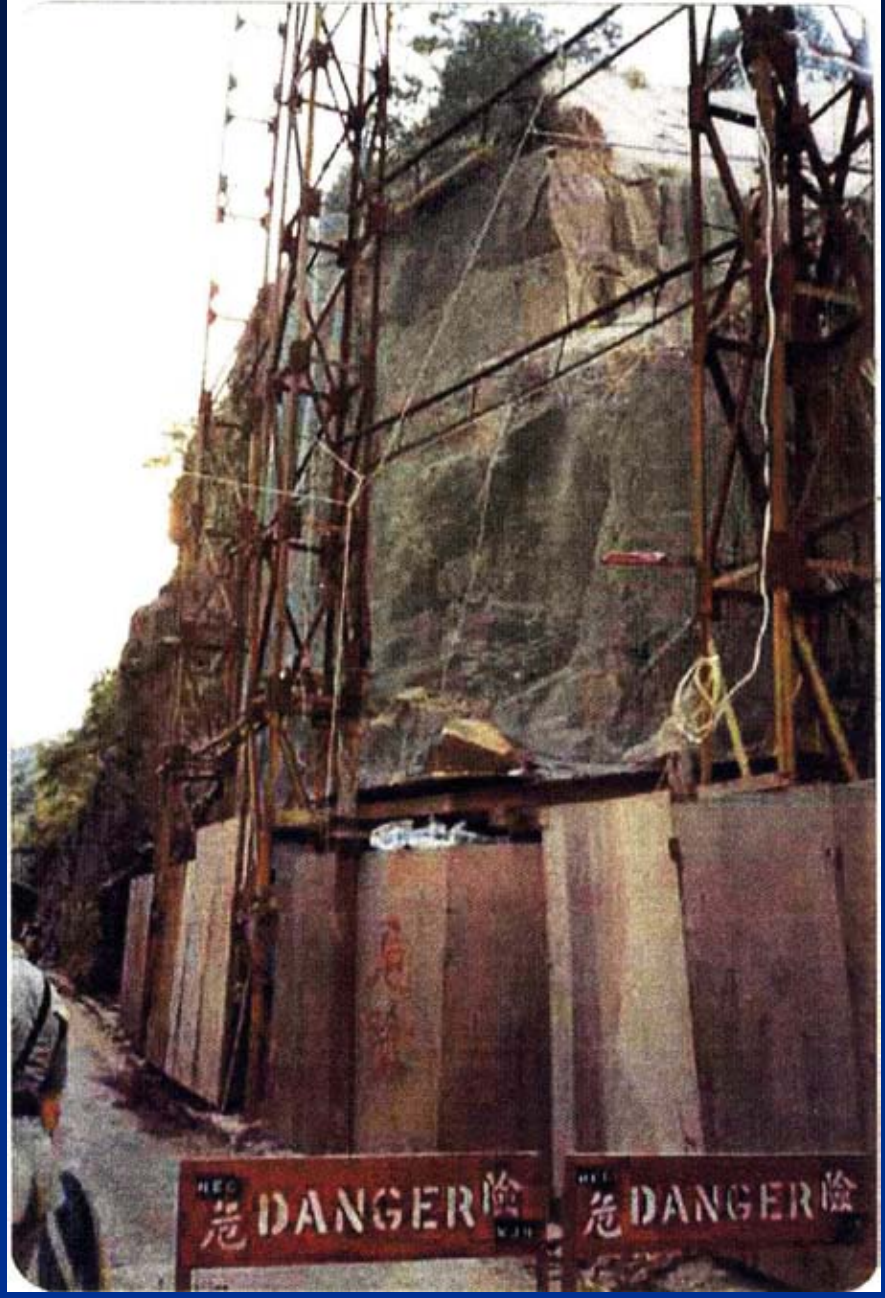
- 12.7.1981 – Failure of slope due to blasting work at No. 399, Yip Kan Street site
  - Slope (about 16m height) located at south-western end of a blasting site failed
  - About 1,250 cu.m. of material (soil and rock)
  - Debris damaged safety fence at slope toe and blocked footpath and part of Yip Kan Street
  - No injuries or death

Sequence of events

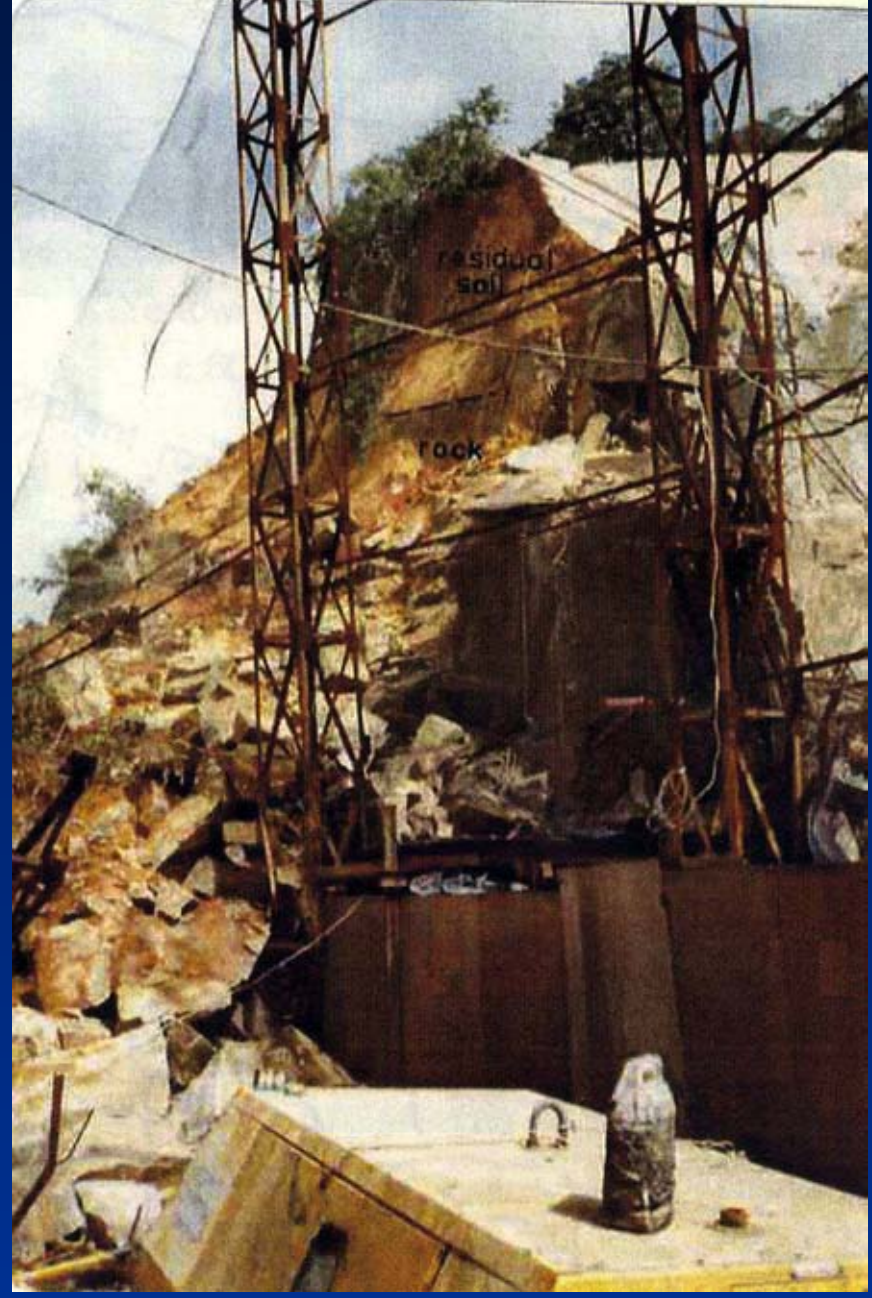
- 30.6.1981 – blasting on SW corner of site
- 4.7.1981 – blasting on SW corner of site
- 5.7.1981 to 7.7.1981 – tropical storm with 83.4mm total rainfall
- 7.7.1981 – cracks appeared on chunamed slope at SW corner of site and were repaired
- 10.7.1981 - blasting on SW corner of site
- 11.7.1981 – cracks observed on chunamed slope and rock slope. Geotechnical consultant recommended closure of Yip Kan Street to pedestrian and traffic. No further blasting to be carried out.
- 11.7.1981 (8 p.m.) – Minor rockfalls, GCO visited site and observed signs of imminent slope collapse. Police assisted to evacuate adjacent buildings.
- 12.7.1981 – slope failed at 02:30 hr.

Features of failure

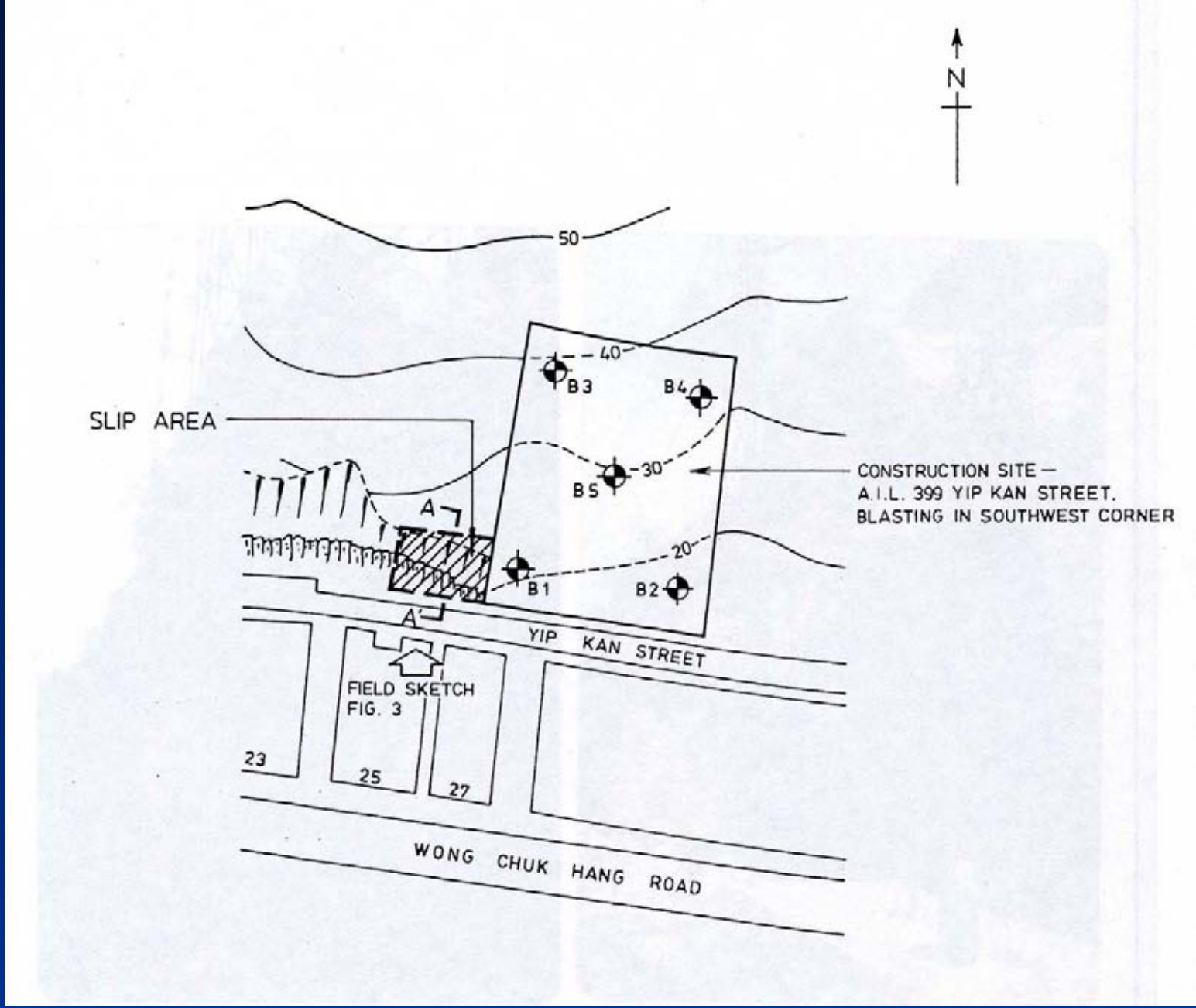
- Composite failure, both soil and rock
- Failure did not occurred immediately after blasting
- Lower 8m slope - widely jointed slightly decomposed monzonite
- Upper 8m slope – reddish brown residual soil, upper 3m was noteiceably damp
- Sliding within the rock mass occurred along stepped surface of planar daylighting joints connected by near vertical release joints



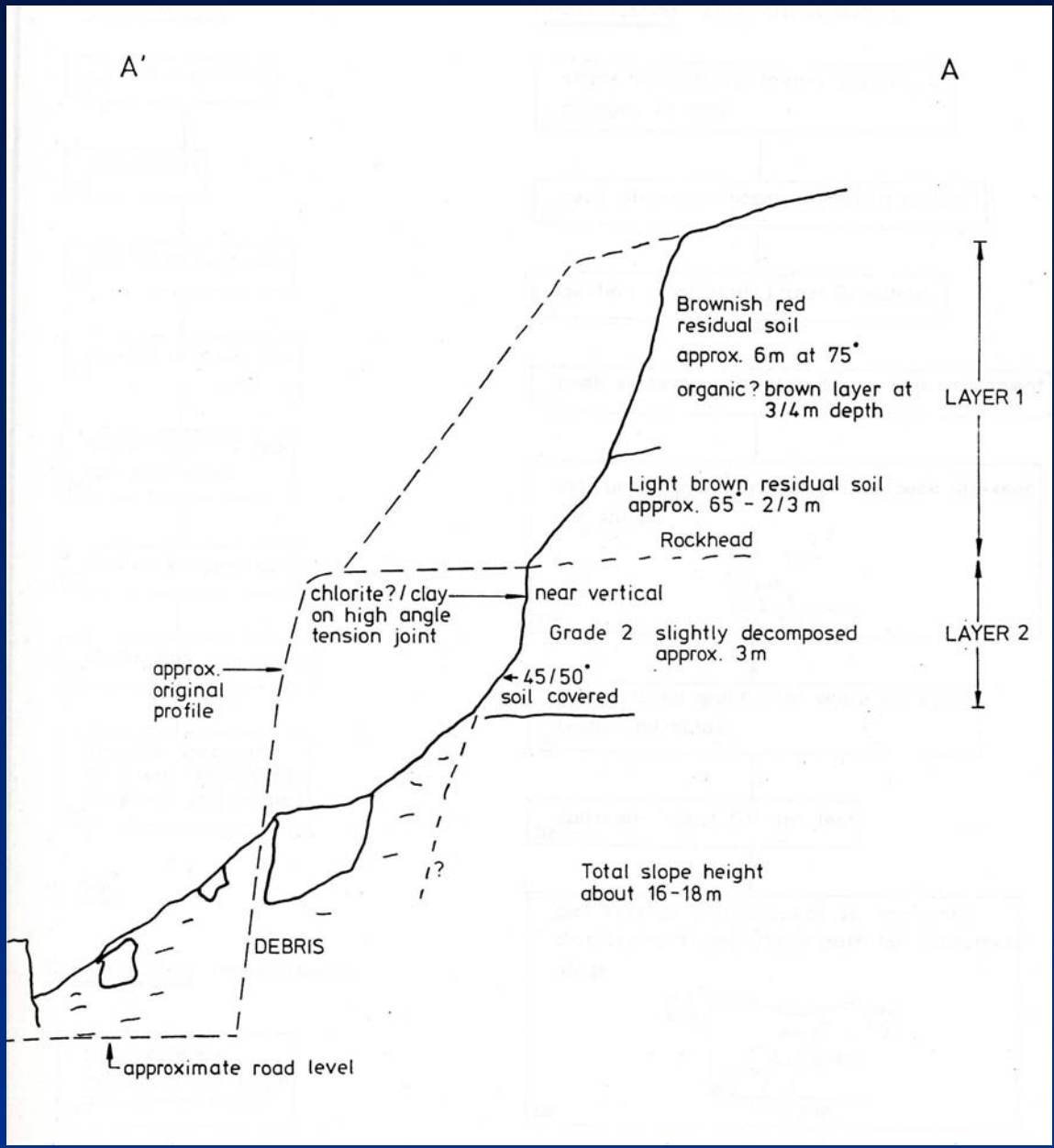
Slope before failure



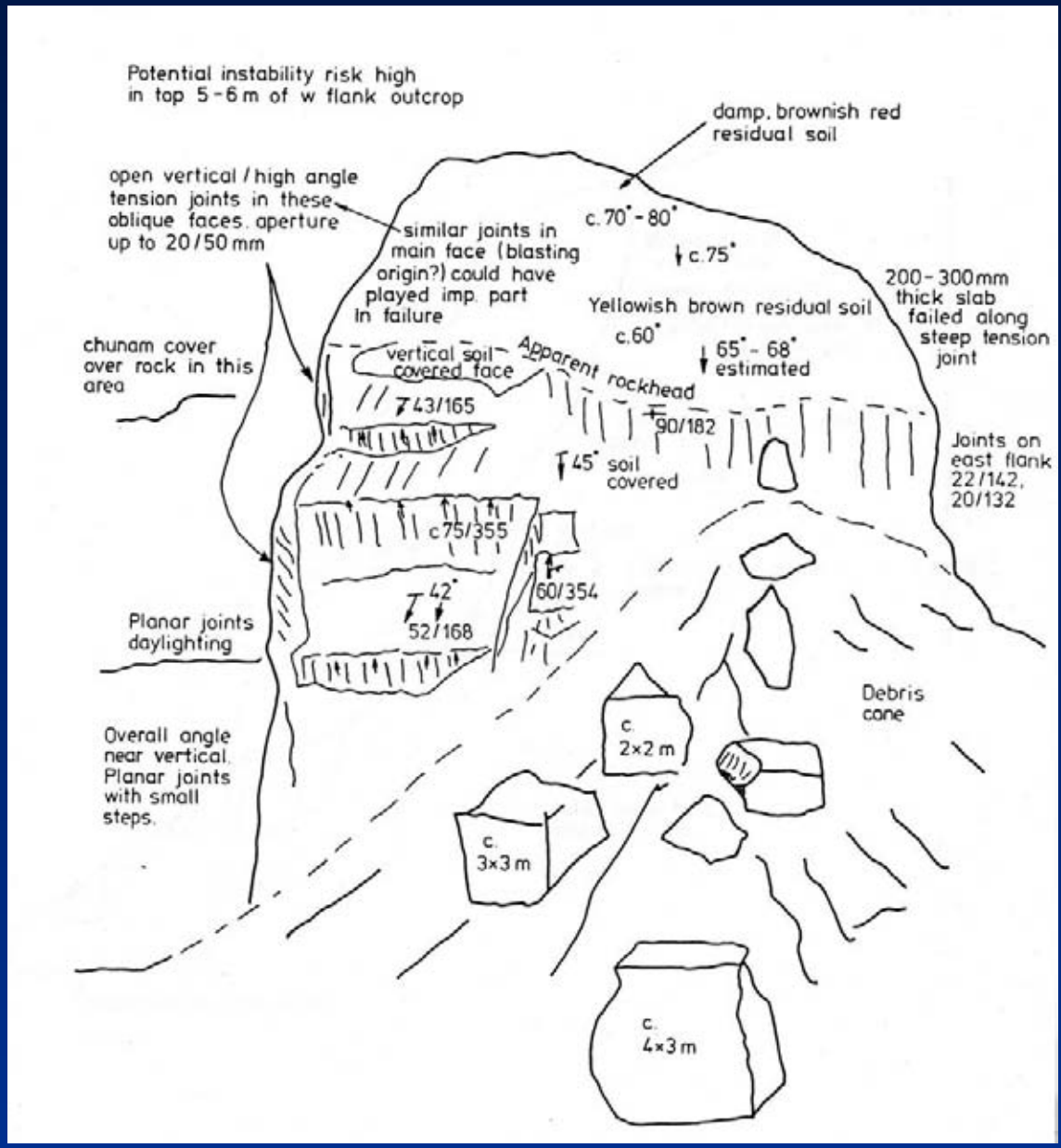
Slope after failure



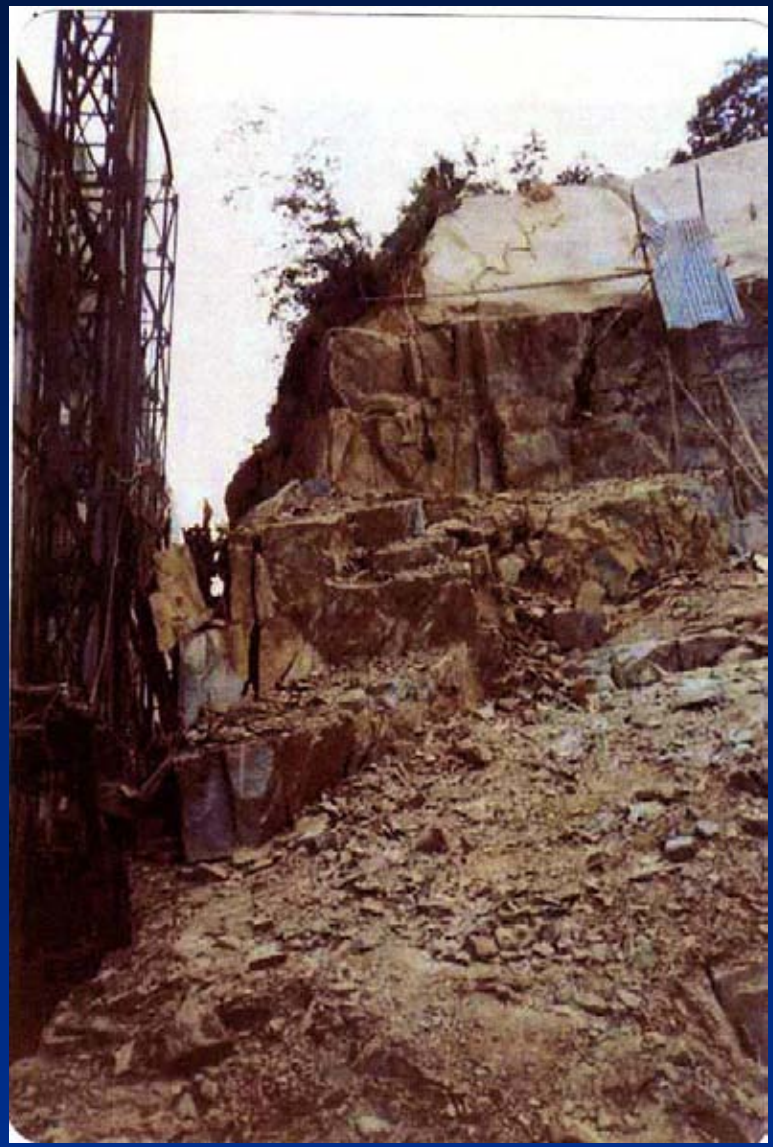
Location Plan of failed area



Cross section A - A

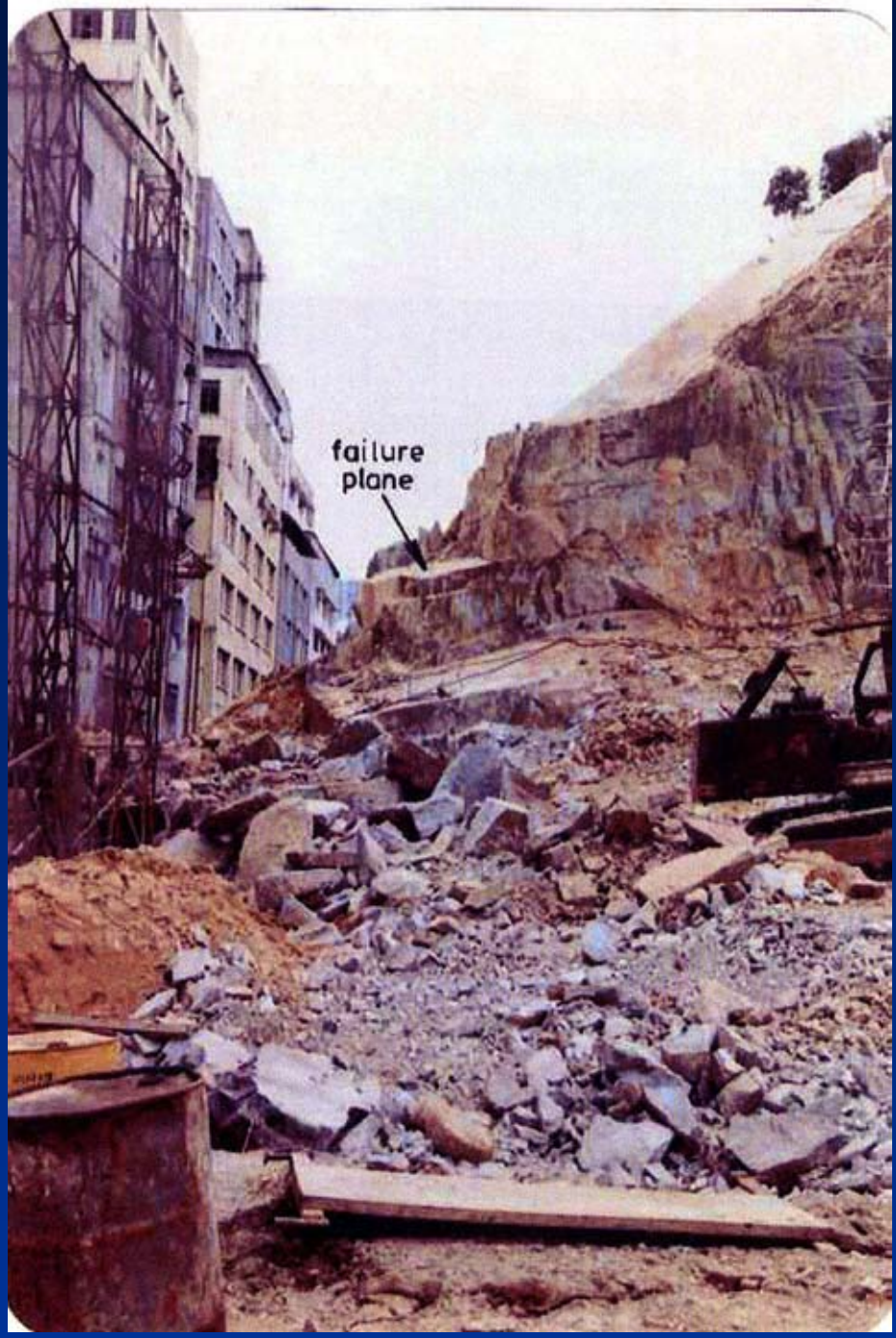


Field sketch of front view of failed slope

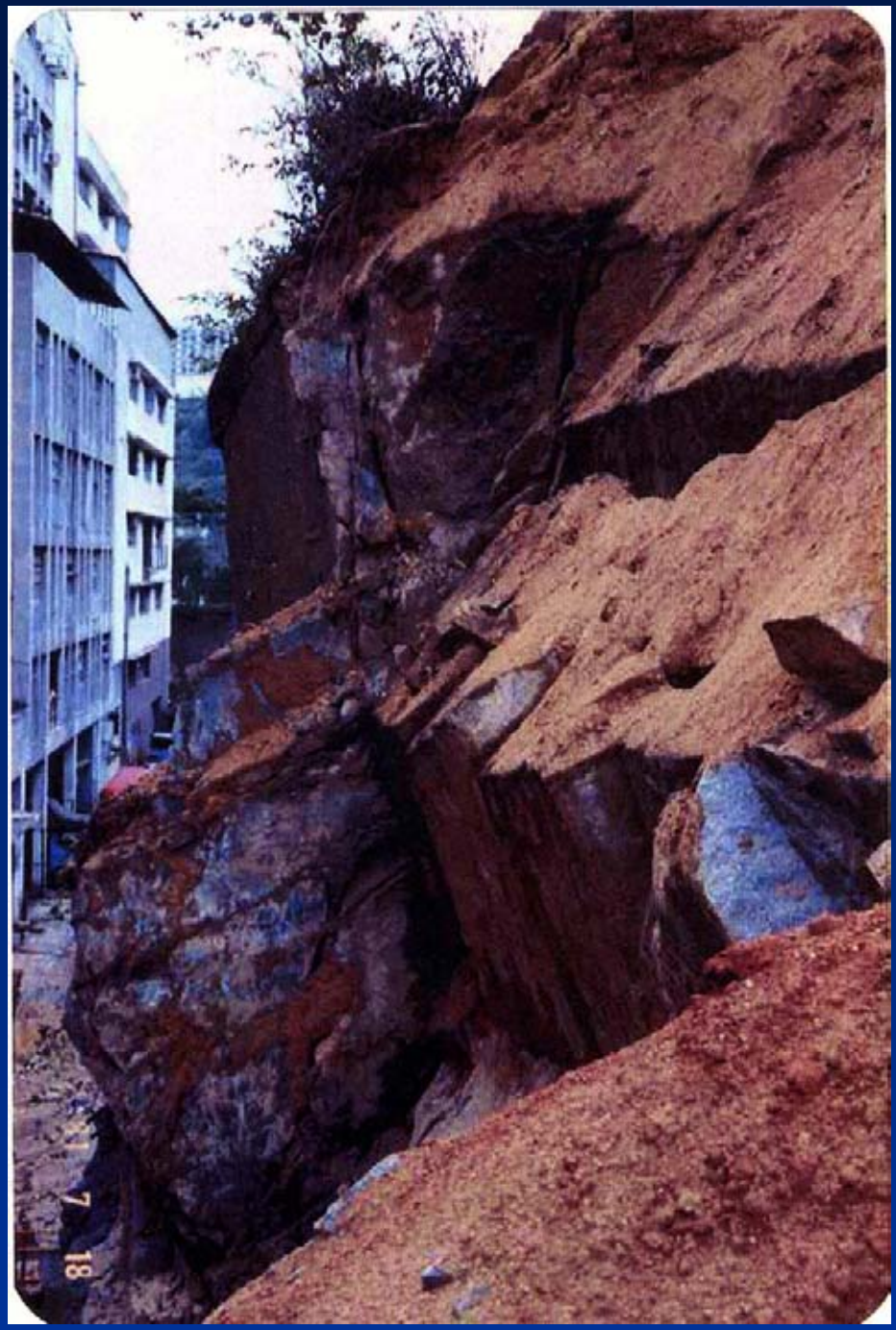


Eastern part of slope
before failure

Eastern part of slope after failure



Eastern flank of slope following removal of debris



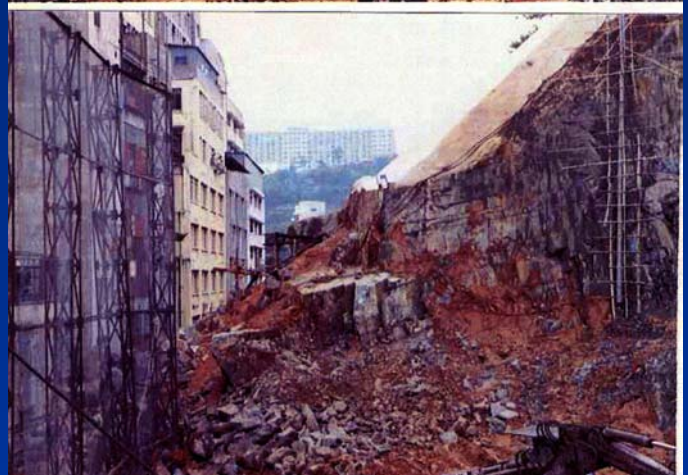
Shattered rock to the west of the main failure scar

Removal of soil debris and trim back soil slope

16.8.1081

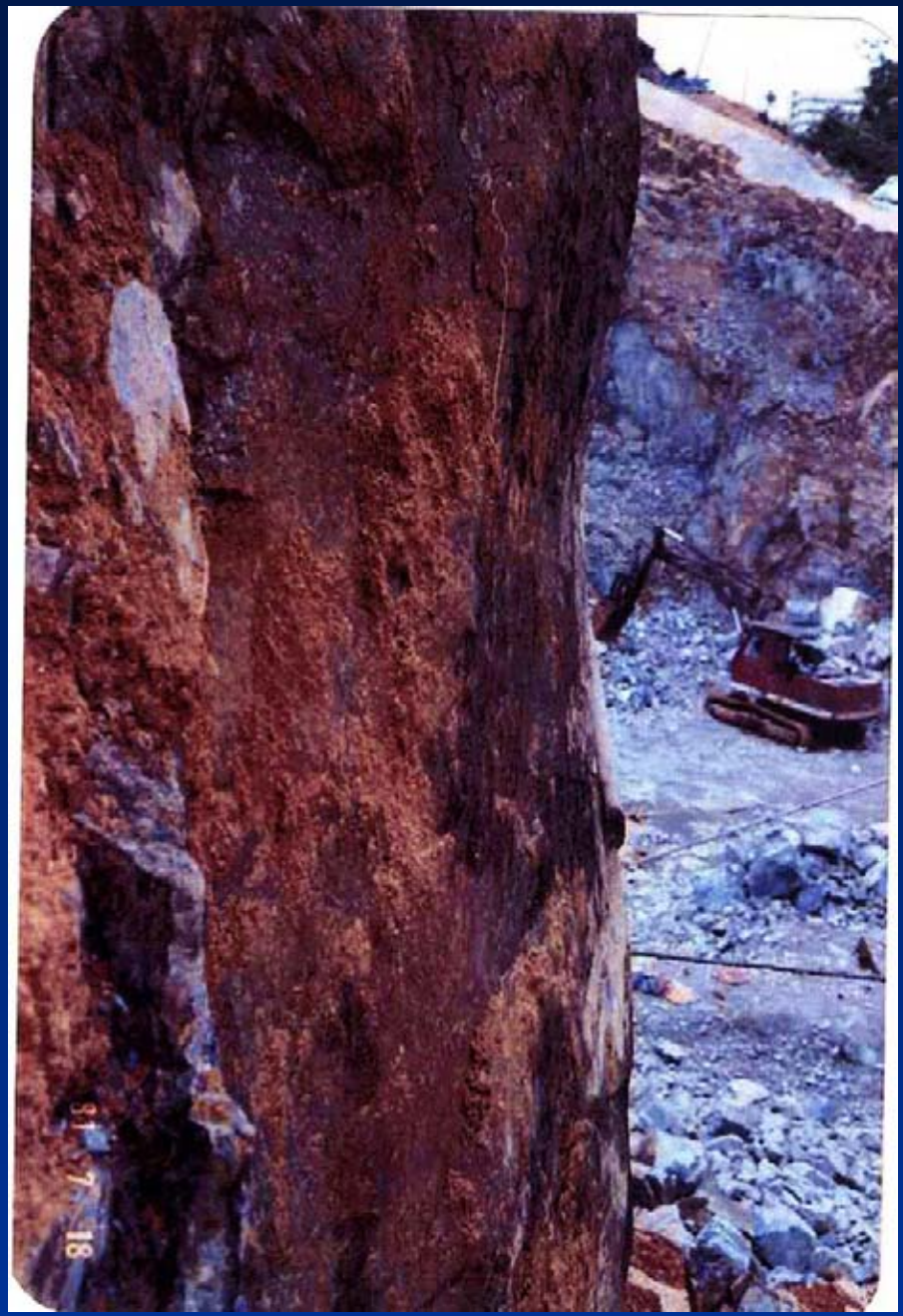
Removal of soil debris continued

30.8.1981



Removal of debris at lower part of slope and exposure of failure plane

5.9.1981



Release joint from which block moved in eastern part of failure

Causes of failure

- Contributing factors
  - Low shear strength and adverse discontinuities
  - Ground water pressure (heavy rainstorm before failure)
  - Blasting – ppv of up to 17.5mm/s at slip location due to blasting on 4.7.1981
- Progressive failure
  - Initiated by blasting or water pressures or by movement in the upper soil slope or a combination of these factors

Case No. 2

Shau Kei Wan

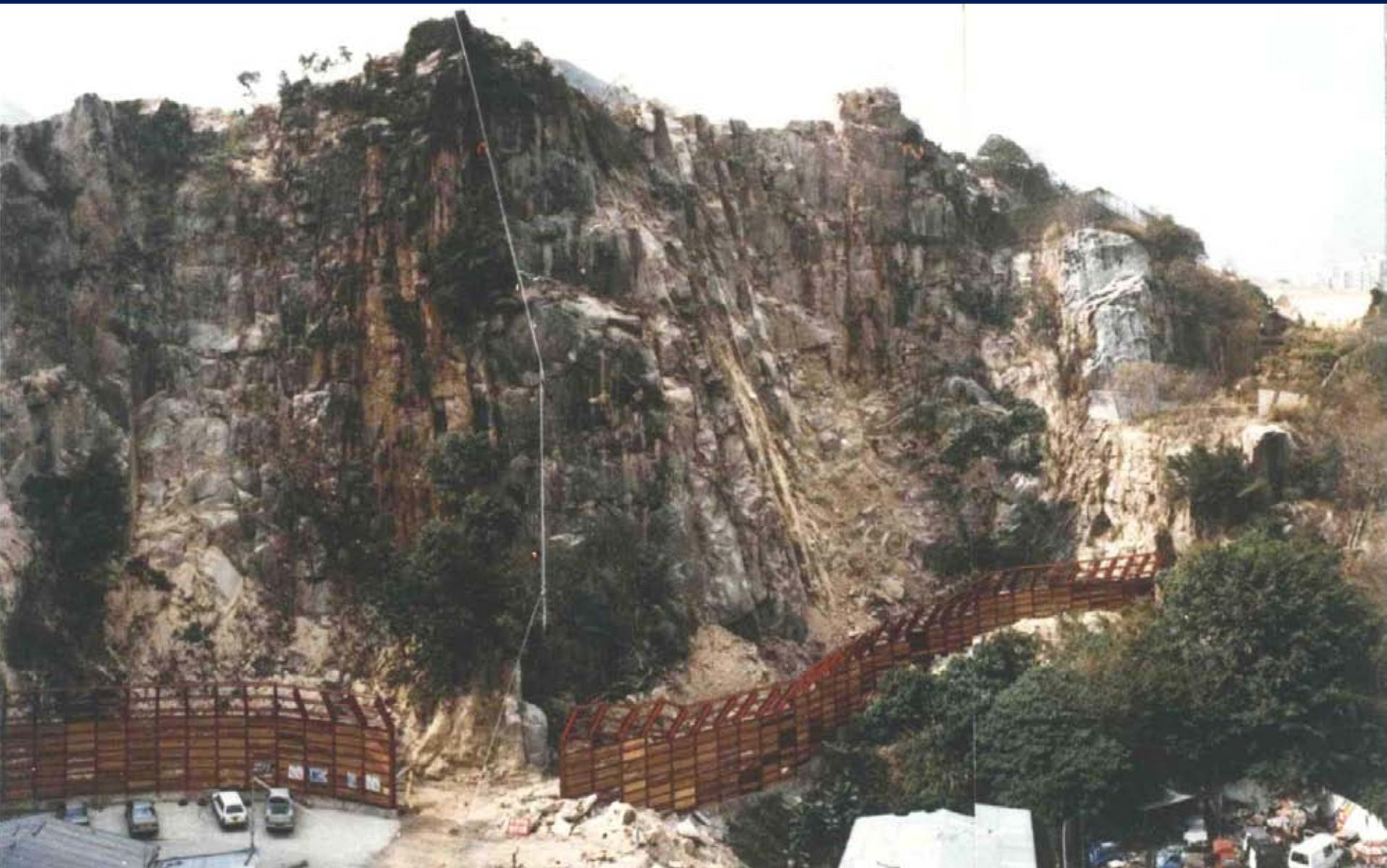
28 February 1991

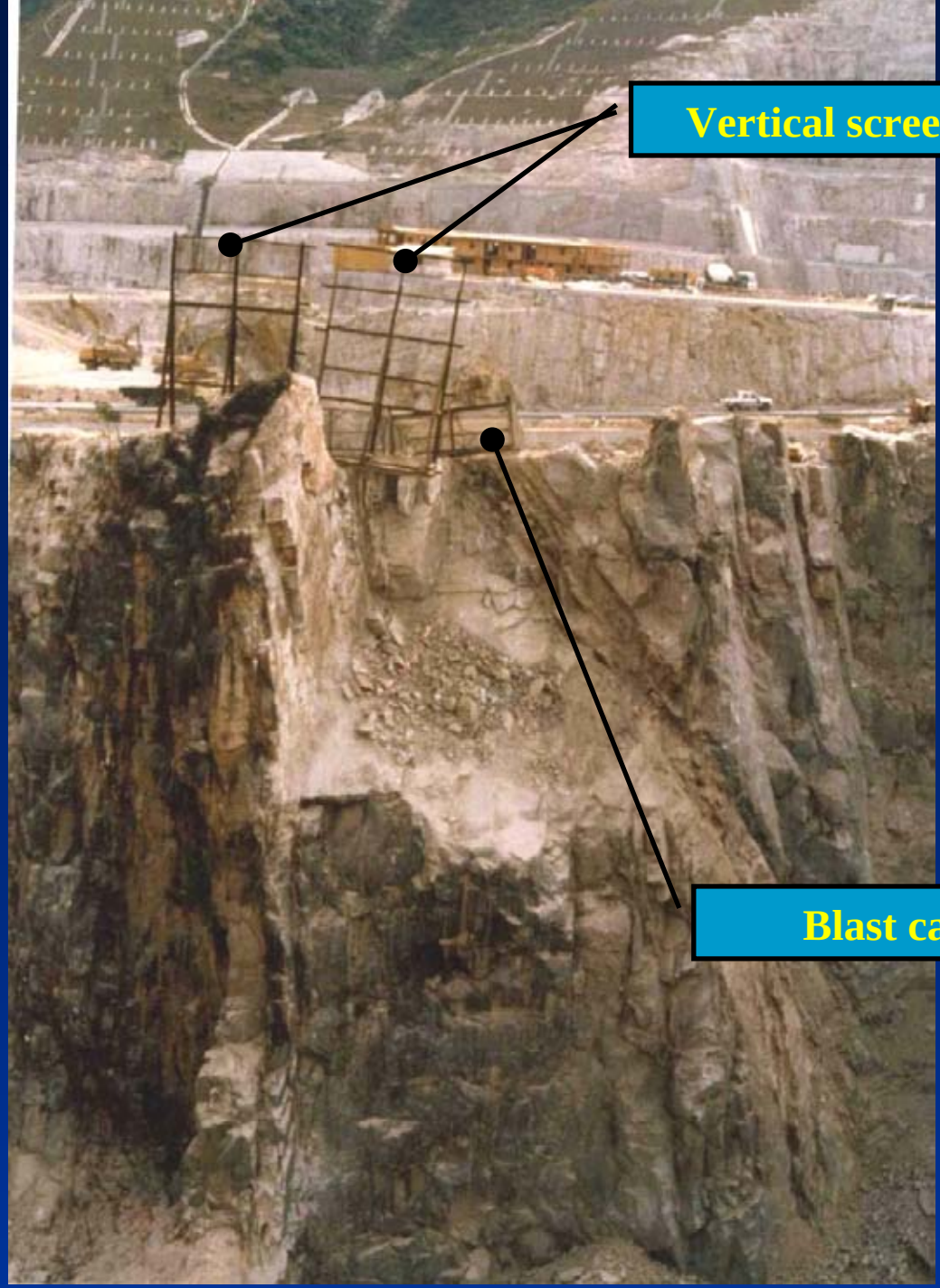
Ref. N C Evans & T Y Irfan (1991). Landslide Studies 1991 : Blast-Induced Rock Slide at Shau Kei Wan. GCO Report No. SPR 6/91.

Shau Kei Wan Site

- 28.2.1991 – Failure of rock slope due to blasting work at Shau Kei Wan site
  - Blasting behind 50m high old quarry face
  - About 2,000 cu.m. of material
  - Debris damaged 4m high fence at 5m away from toe, 6 container offices and 4 vehicles
  - One person injured by impact of rebounding rock fragment
  - Debris traveled up to 30m from toe
  - Dust covered streets and cars 100m away

Old quarry face before failure



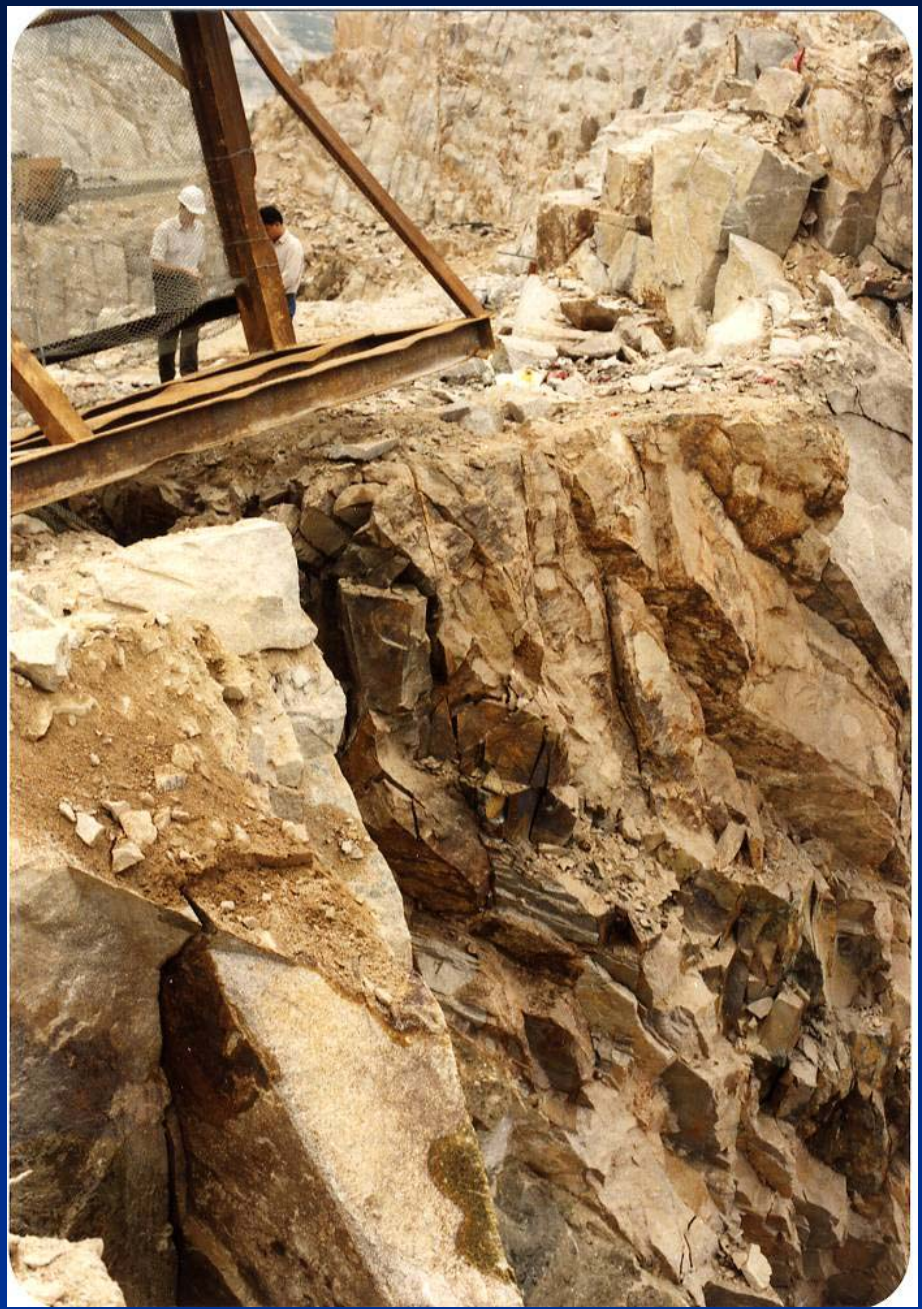


Blasting induced failure on 28.2.1991 causing injuries and damage to properties

Failure debris at slope toe

Failure surface after clearance of debris

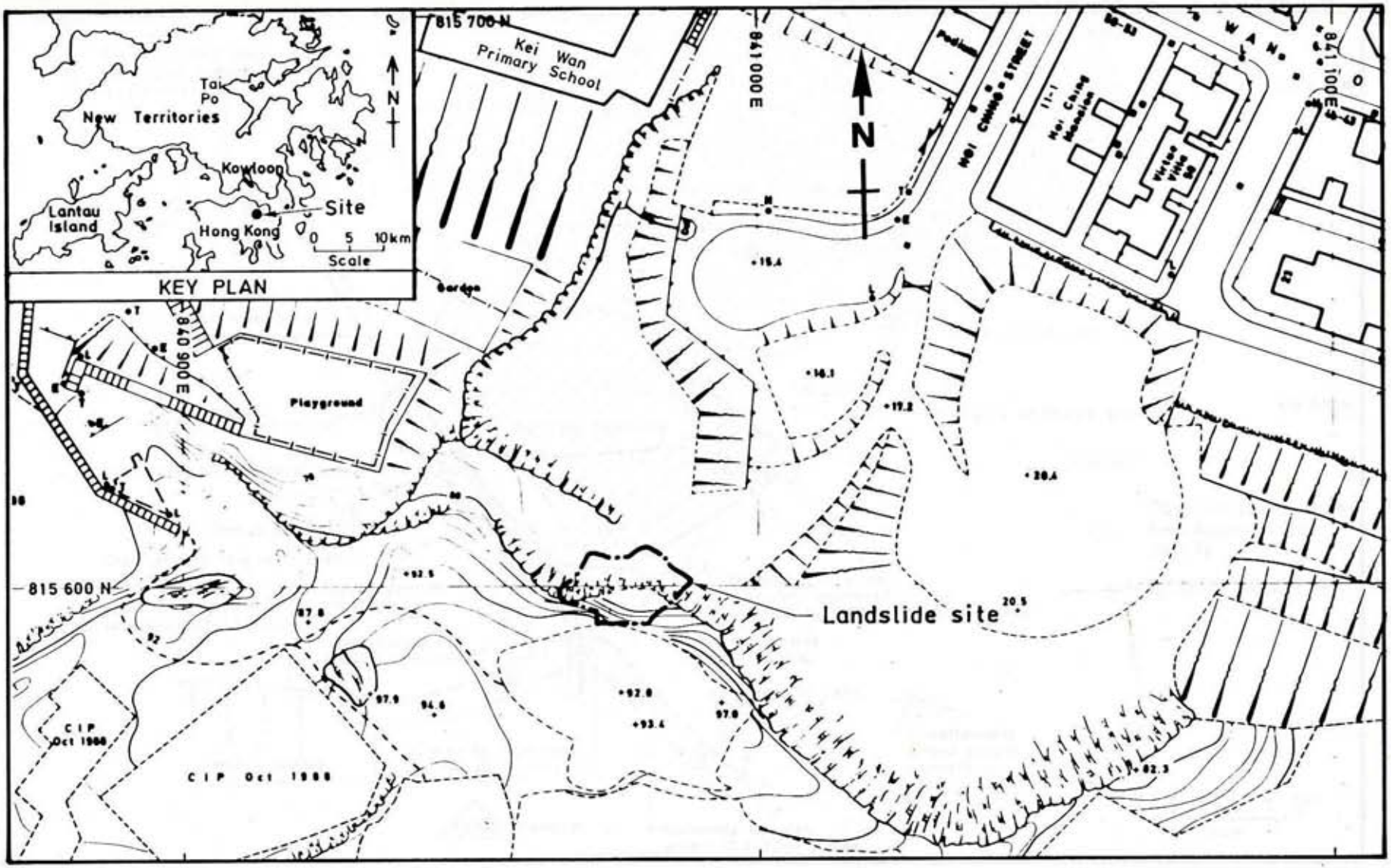
Basalt dye and shear zone



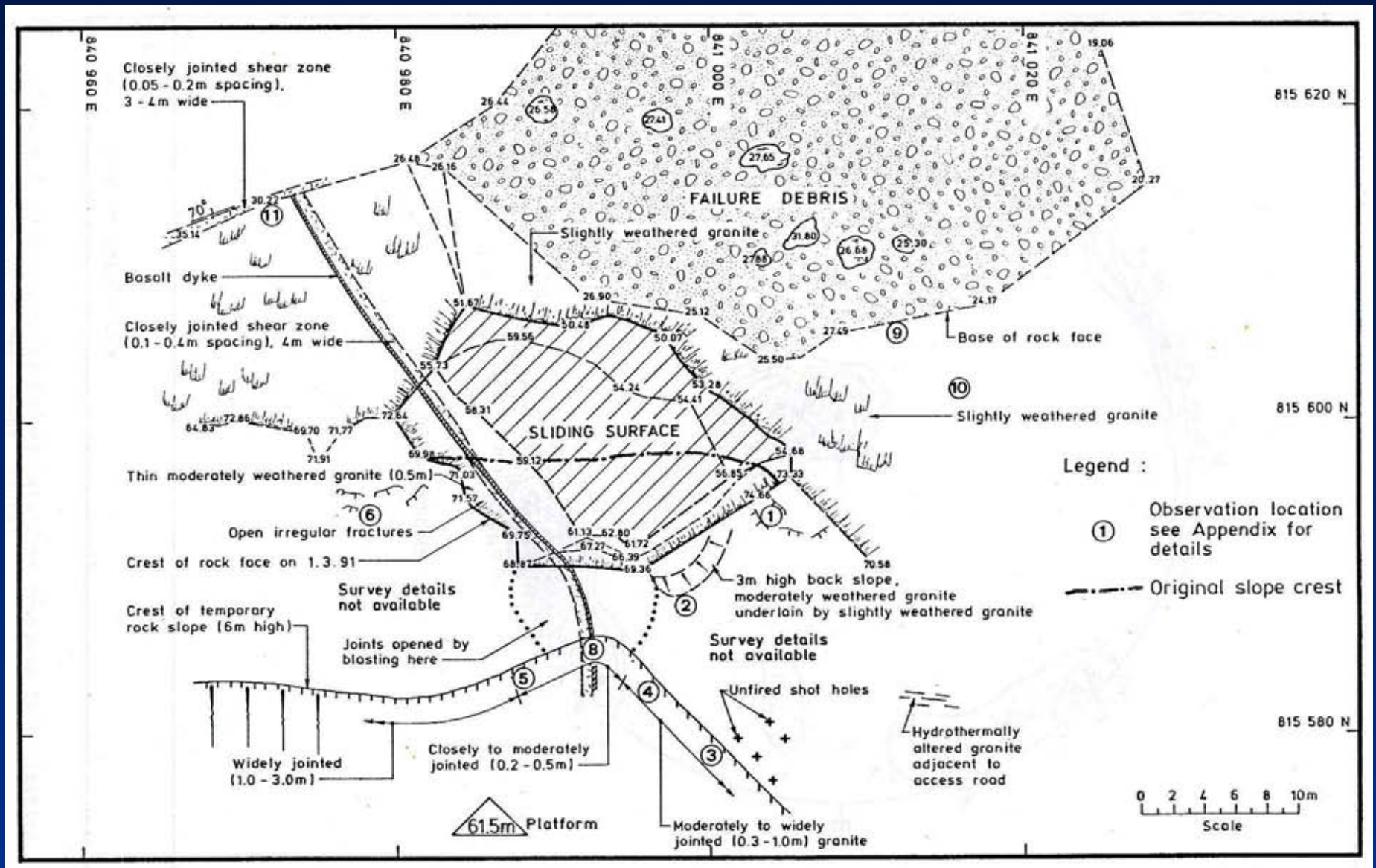
Western release surface with the shear zone and basalt dyke

Crest area of the landslide

Loosening and shattering of rock at crest

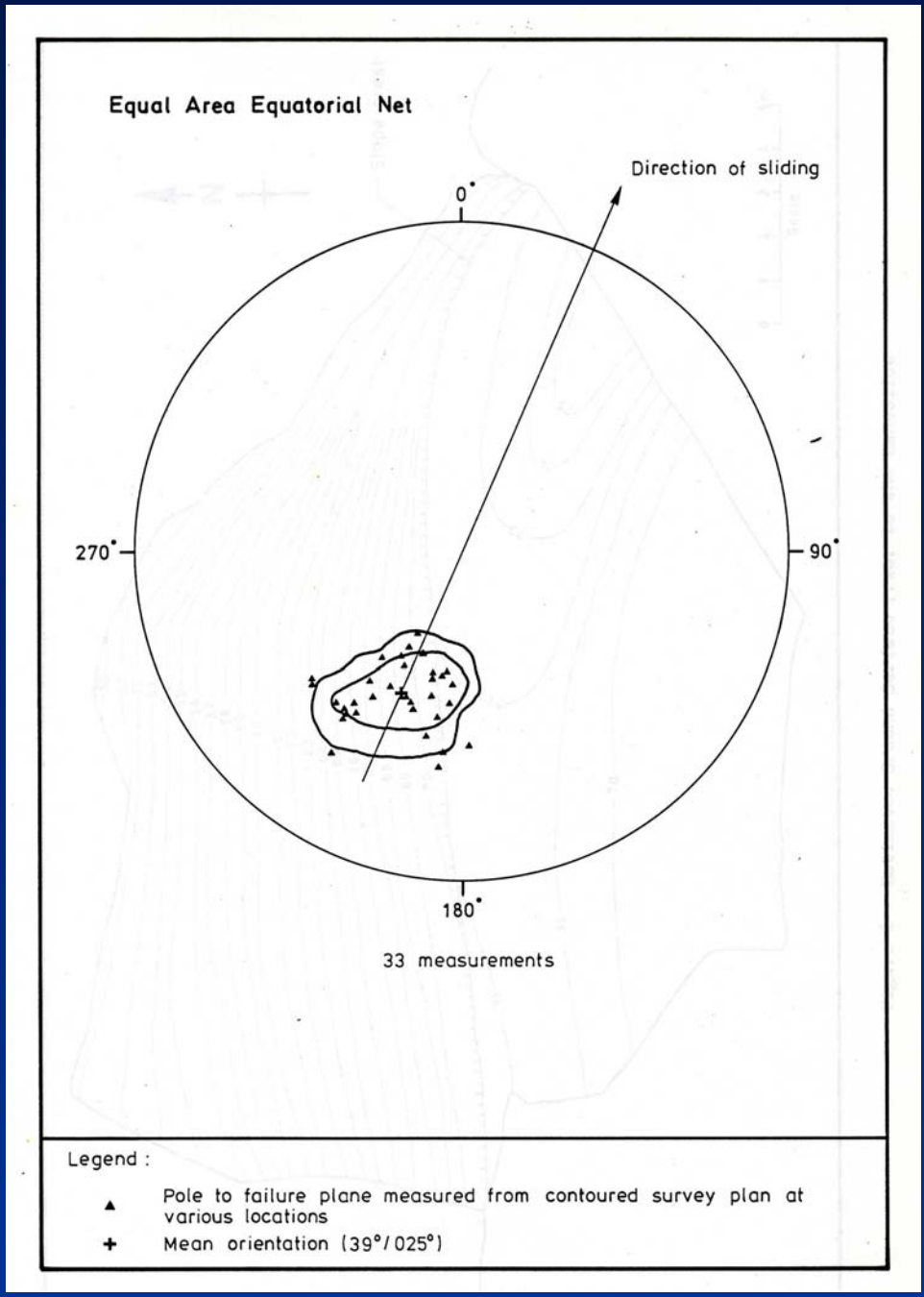


Location plan



Plan of landslide area showing main geological features

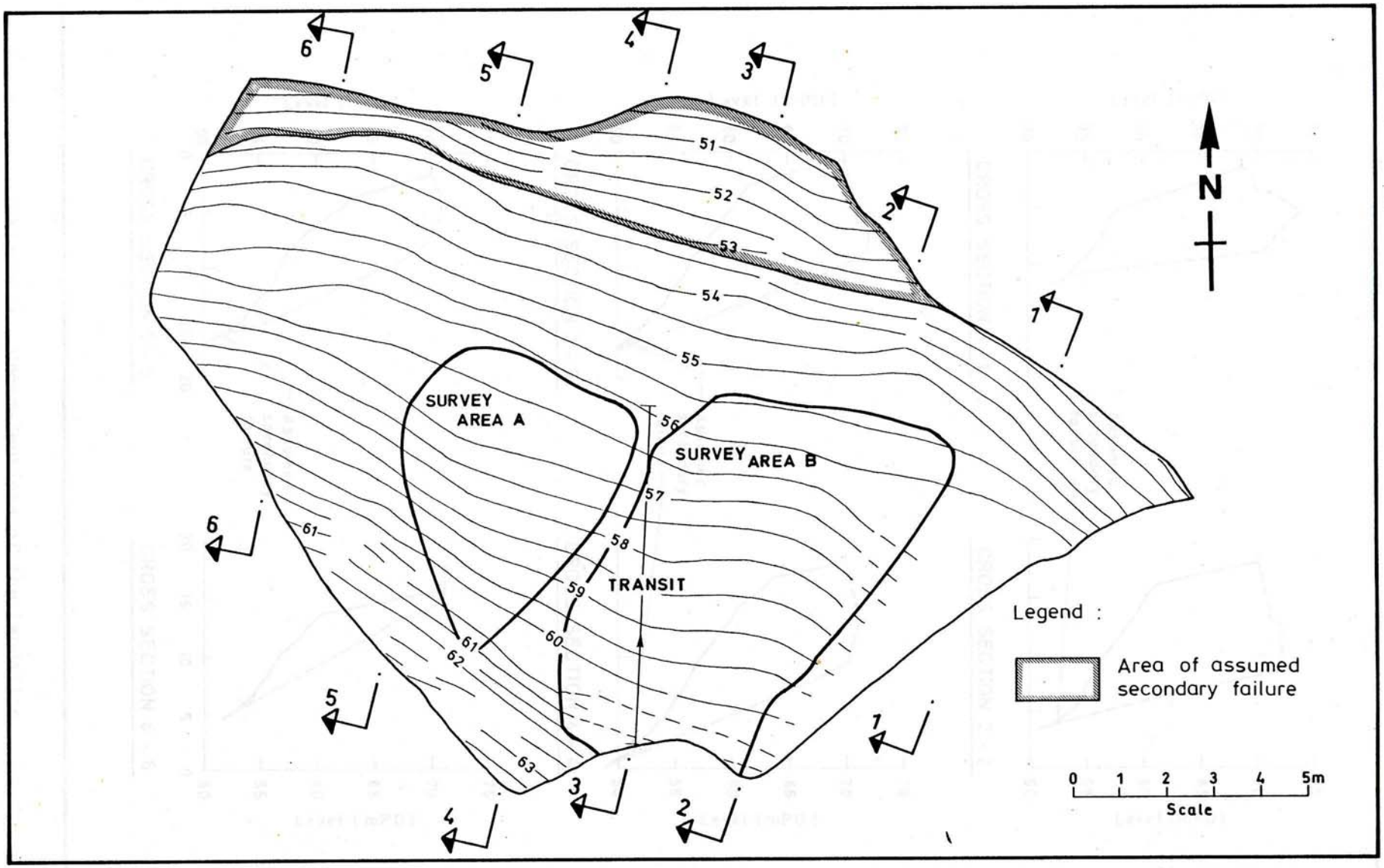
- **Rock face composed of medium grained granite with a number of basalt dykes at western part of landslip scar**
- **Existed in 1949 with quarrying activities up to 1972**
- **1986 study report included geological mapping up to 30m rock face from toe**
- **Original crest level at about 90 m PD**
- **Blast No. 696 (Portion 3A)**
  - **28 nos. 75mm dia. holes, 10 m depth, 2m x 2m, 700 kg explosives, 29 kg/delay, 0.57 powder factor**
  - **Last row of holes at 15m from crest line**



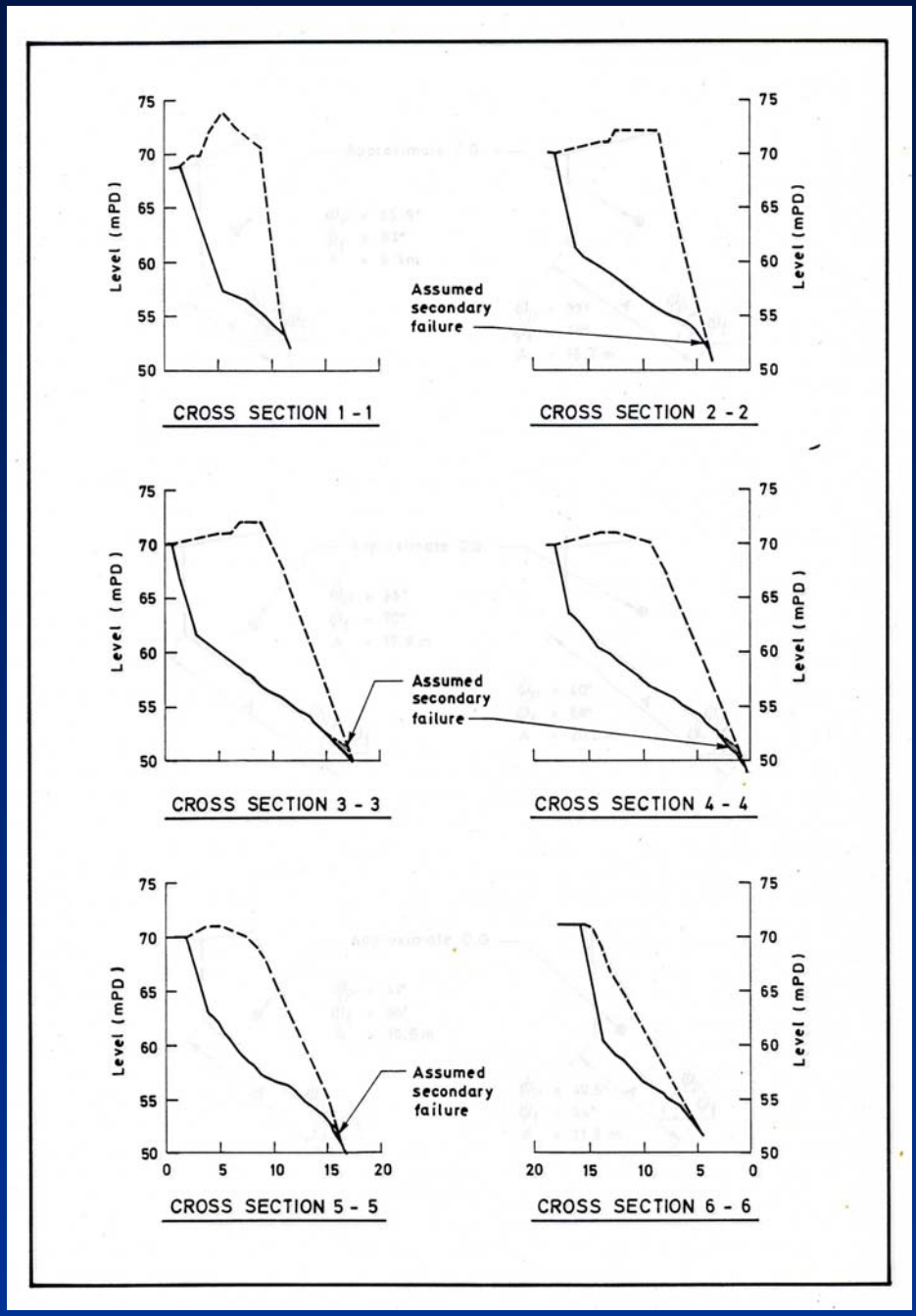
Orientation of the sliding surface

Dip angle – 39 deg

Dip direction - 25 deg

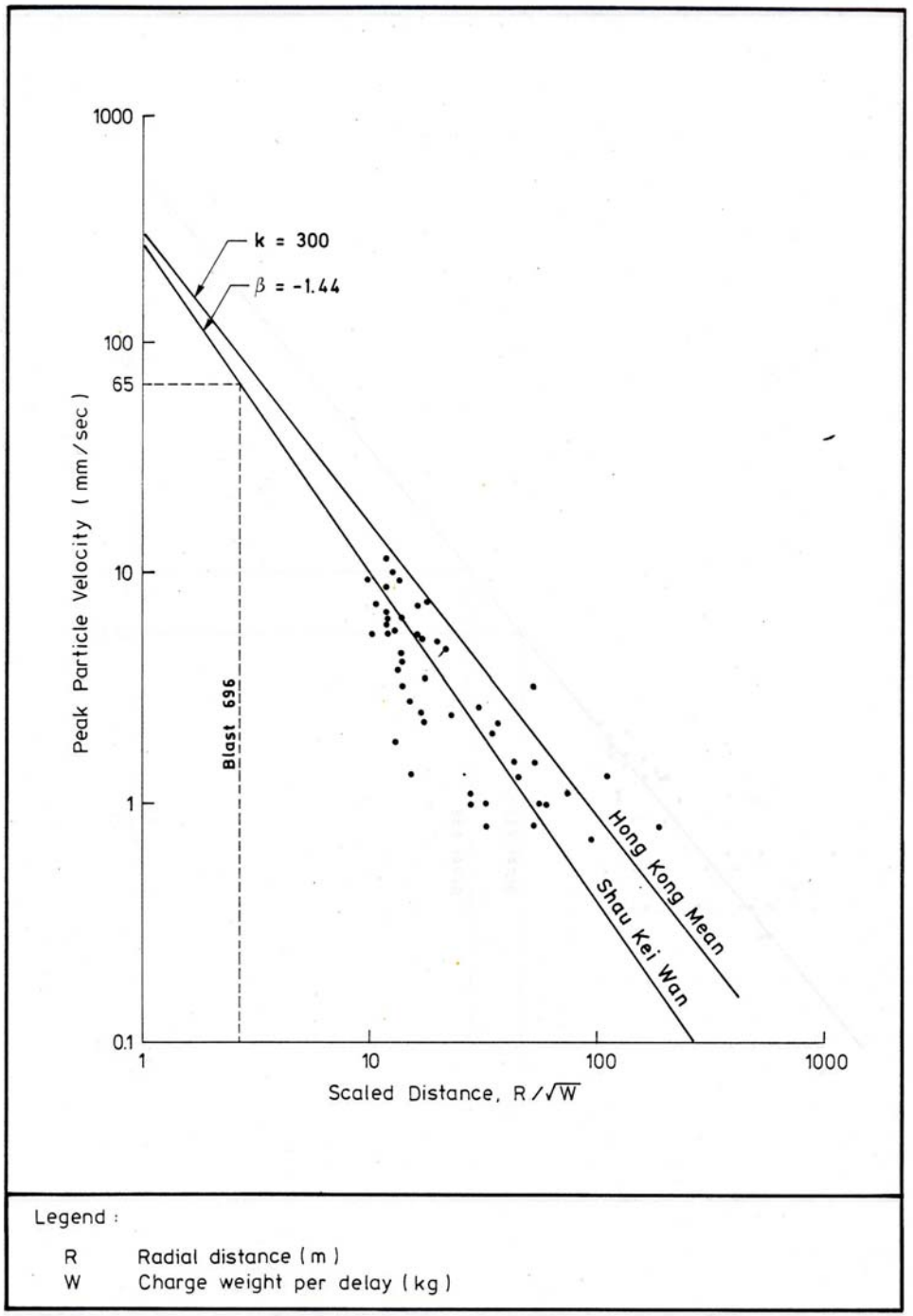


Contoured plan of sliding surface

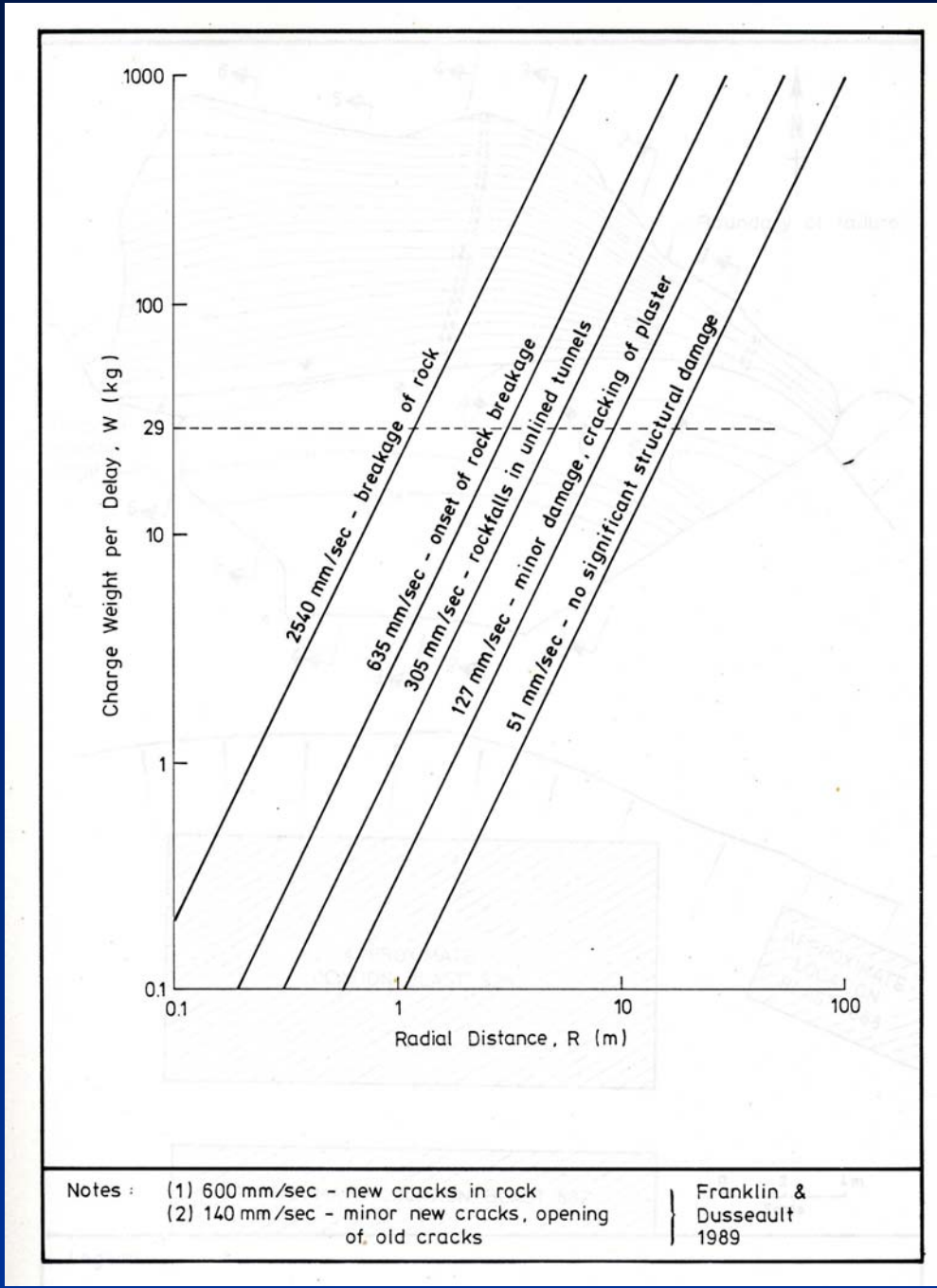


Cross sections of the landslide

Height from top to bottom about 20 m



Peak particle velocity vs. scaled distance for Shau Kei Wan site



Site specific relationships between particle velocity, maximum charge weight and blast damage (Hoek & Bray 1981)

Causes of failure

- Blast induced failure, estimated acceleration of about 1.25g on the failed mass
- Use of relatively high powder factor 0.57 kg/cu.m. as with other blasts in the vicinity
- Presence of shear zone and basalt dyke in the blast area
- Sliding surface defined by an undulating joint belonging to a minor discontinuity set in the rock face
- Reduction of shear strength of rock joint due to accumulated blasting

Recommendations

- To assess the effect of blasting on rock mass, static stability assessments should be accompanied by dynamic stability assessments
- Total statistical approach of data collection and analysis may not be able to identify the critical joints which have minor or single occurrence in a rock mass. All critical discontinuities should be recorded and analysed individually.

Blasting Assessment Report (Background) (1)

- Submission of documents to assess the effects of proposed blasting using explosives is feasible and practicable and will not adversely affect adjacent sensitive receivers (i.e. geotechnical features (rock and soil slopes, retaining walls), structures and utilities etc.)
- GEO Report No. 15 (1992) – Assessment of stability of slopes subject to blasting vibration

BAR (Background) (2)

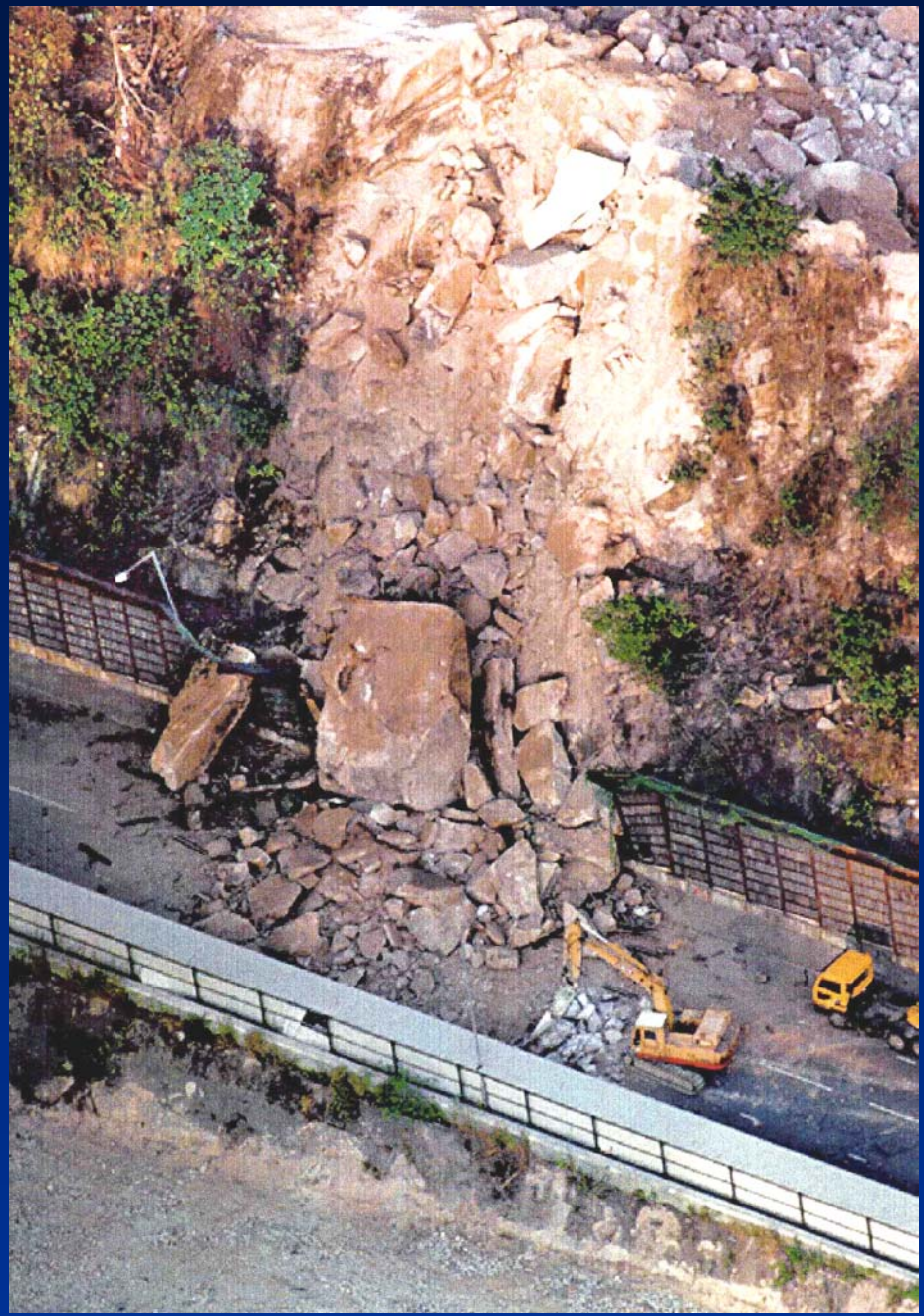
- Buildings Department Practice Note for Authorized Persons (PNAP) No. 178 – Control of Blasting (issued in June 1995, 2007 revision) for private projects
- Hong Kong Government Project Administration Handbook for Civil Engineering Works – for public projects
- GEO Circular No. 27 – Geotechnical Control of Blasting (revised in July 2006)
- GEO Report No. 102 – A Study of the Effect of Blasting Vibration on Green Concrete

Case No. 3

Sau Mau Ping Road

4 December 1997

Ref. : B N Leung, S C Leung & C A M Franks (1997). Report on the Rock Slope Failure at Cut Slope 11 NE-D/C7 along Sau Mau Ping Road on 4 December 1997. GEO Report No. 94.



Reproduced from Sing Pao dated 5.12.1997

Sau Mau Ping Road slope failure on 4.12.1997

25m high rock slope about 60 deg.

1,000 cu.m. of material collapsed towards Sau Mau Ping Road

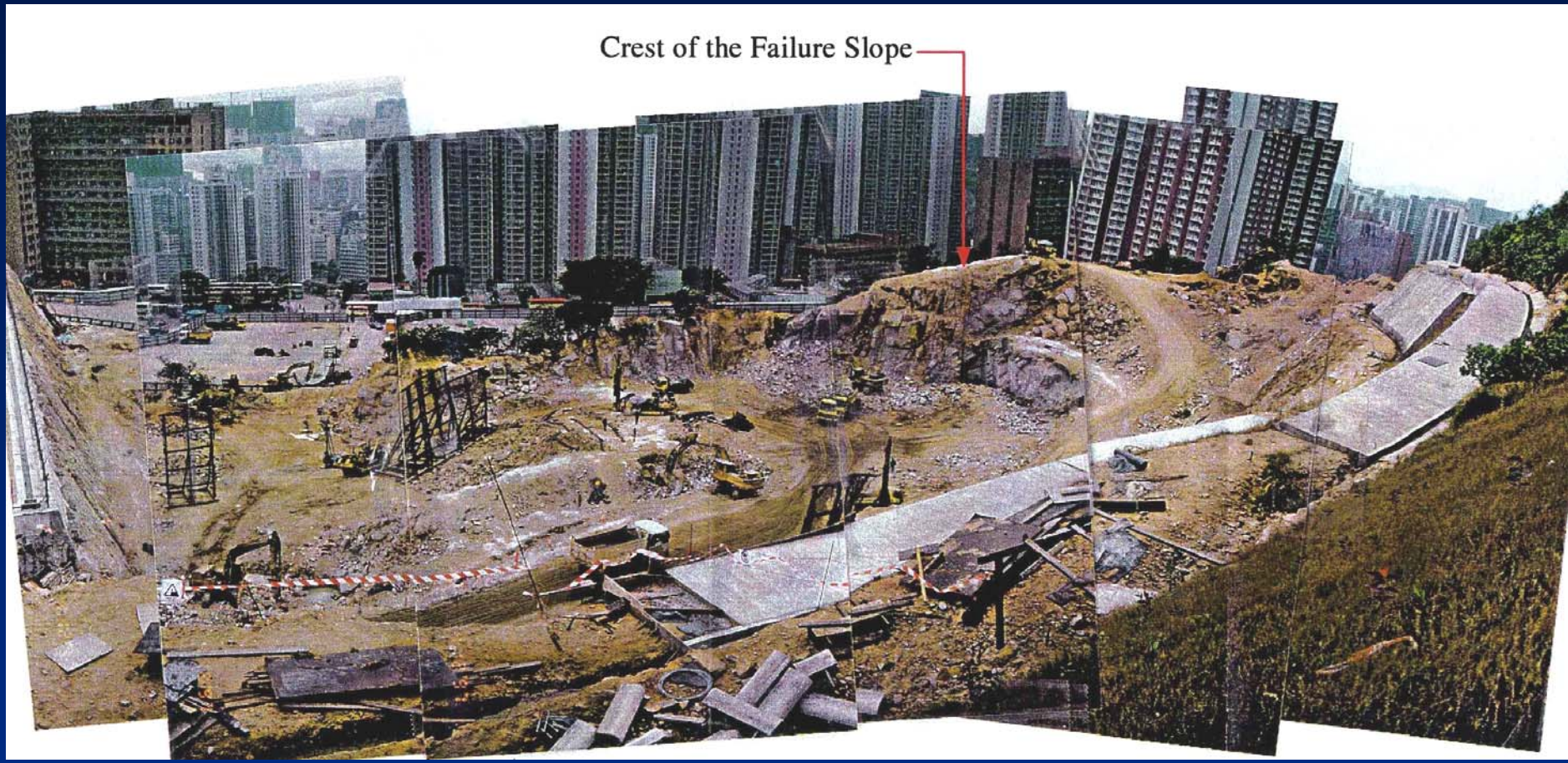
Largest rock block of 150 cu.m.

7.1 m high temporary protective fence damaged

Affects 4 lanes of road covering 25m length

Road closed for 17 days to facilitate removal of debris, repair of protective fence and damaged road

No injury or death

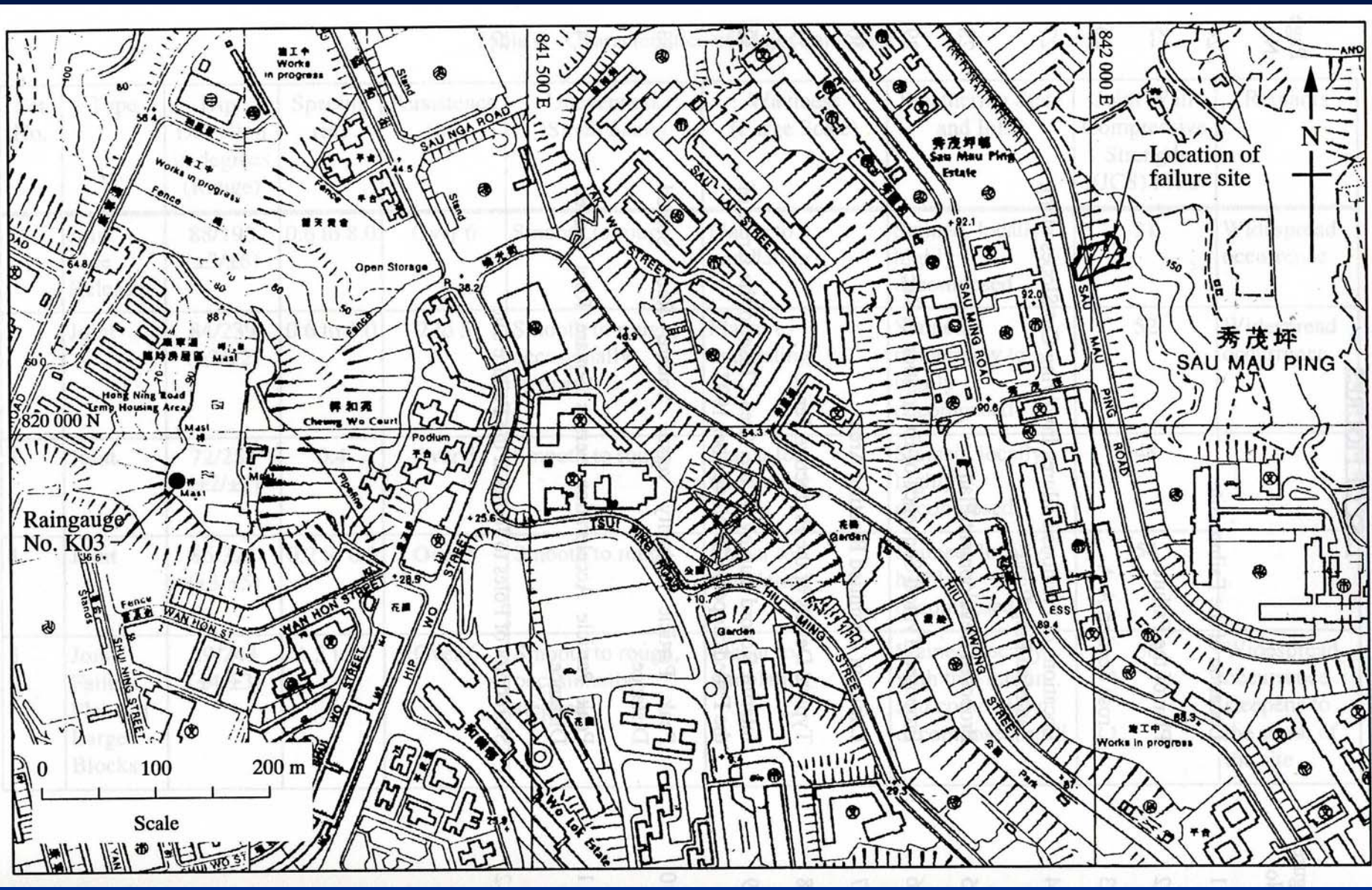


View of site before failure (taken on 4.12.1997)

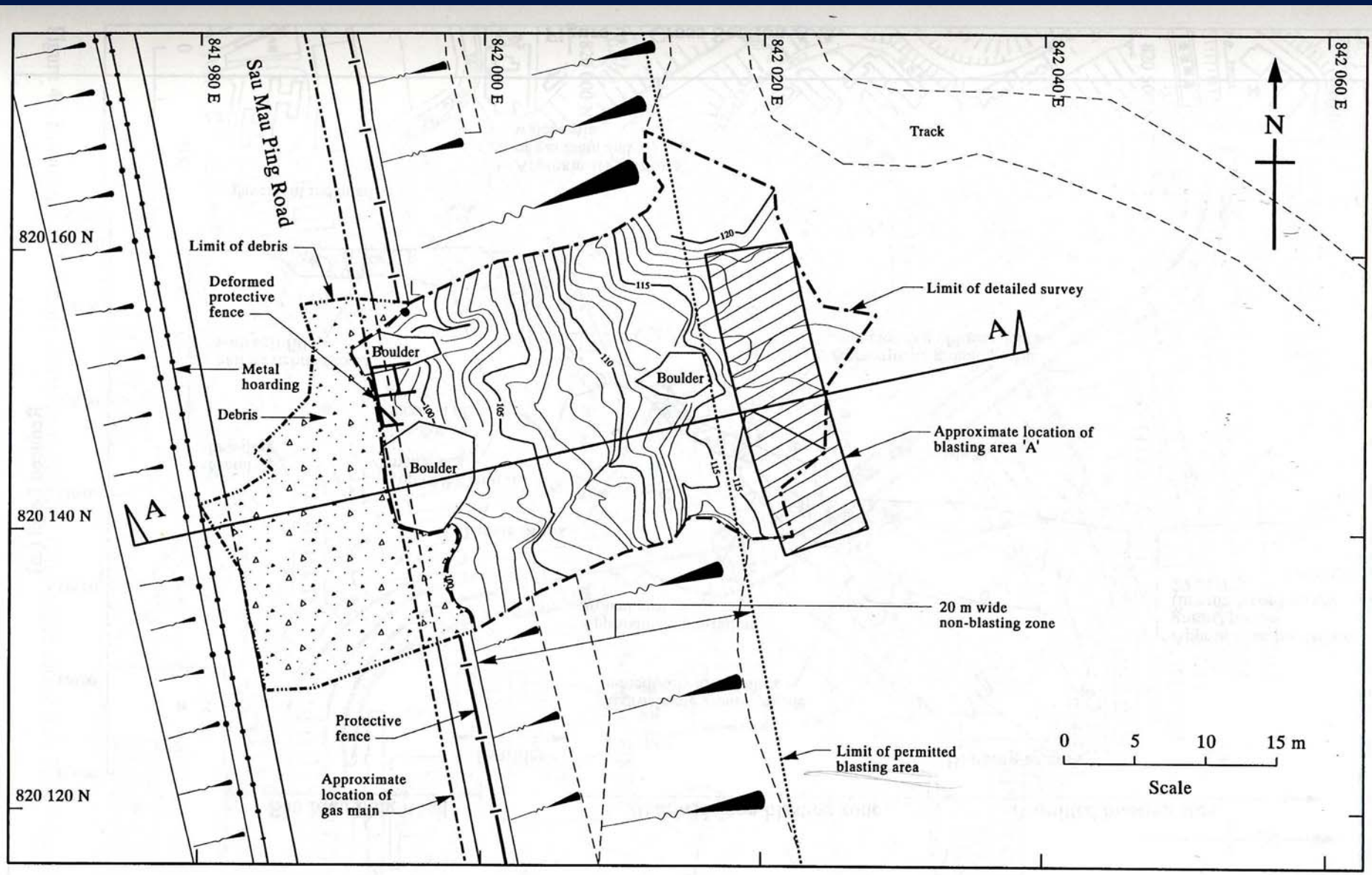
Closed up view of blast area before failure 4.12.1997

Blast damages observed in the vicinity of the failure site

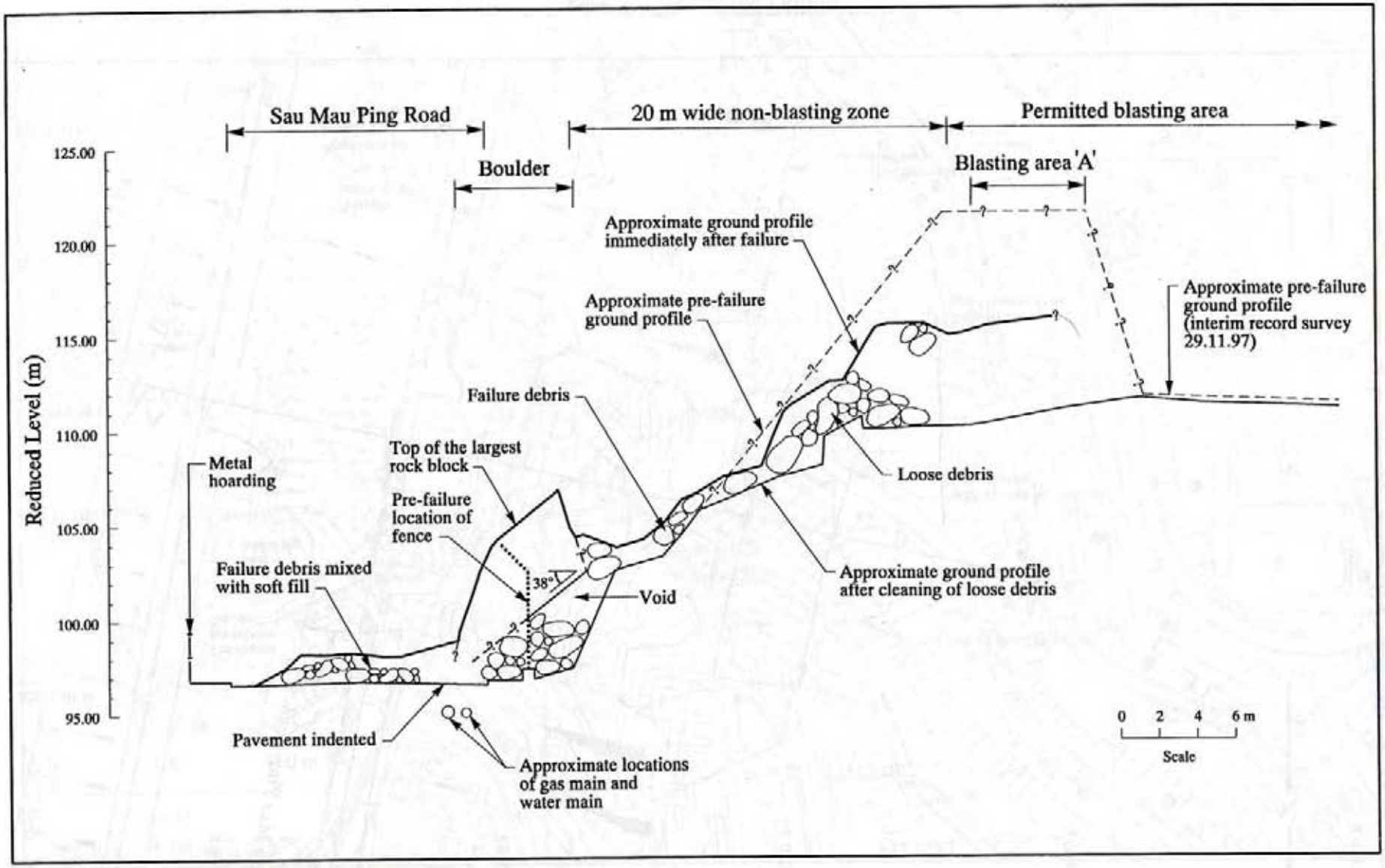
Slickensiding observed on the sub-vertical face of the largest block of rock



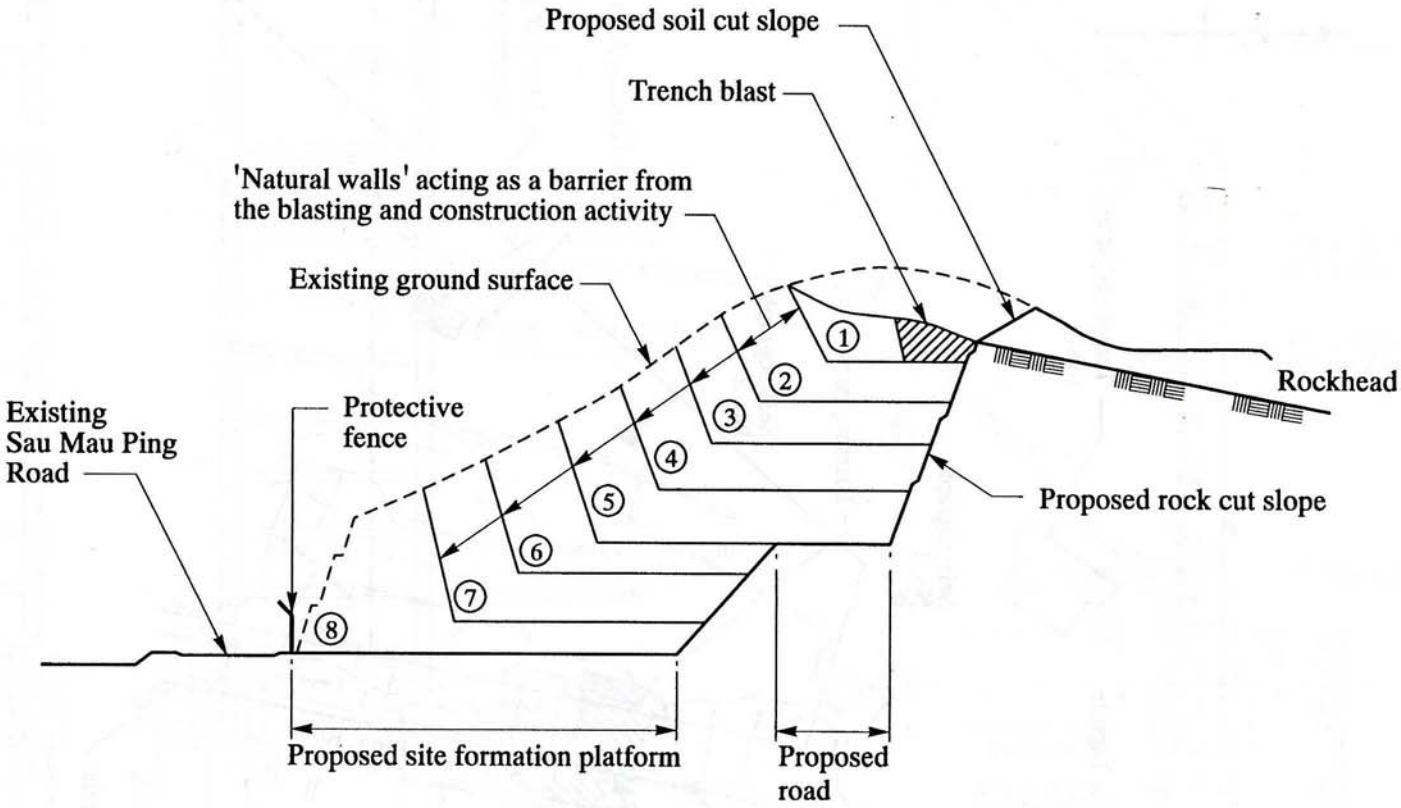
Location of the failure site



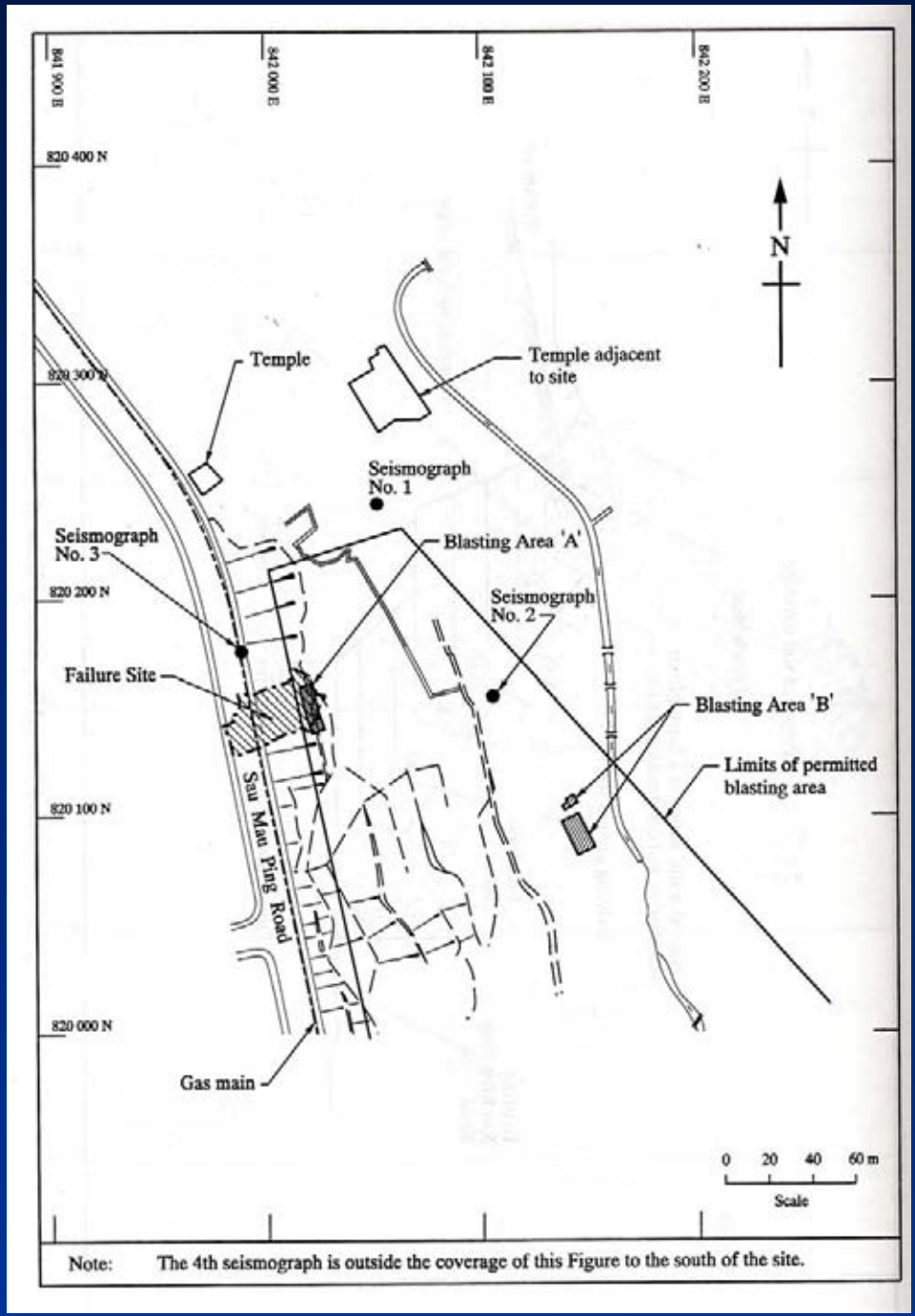
Plan of the failure



Cross section A - A

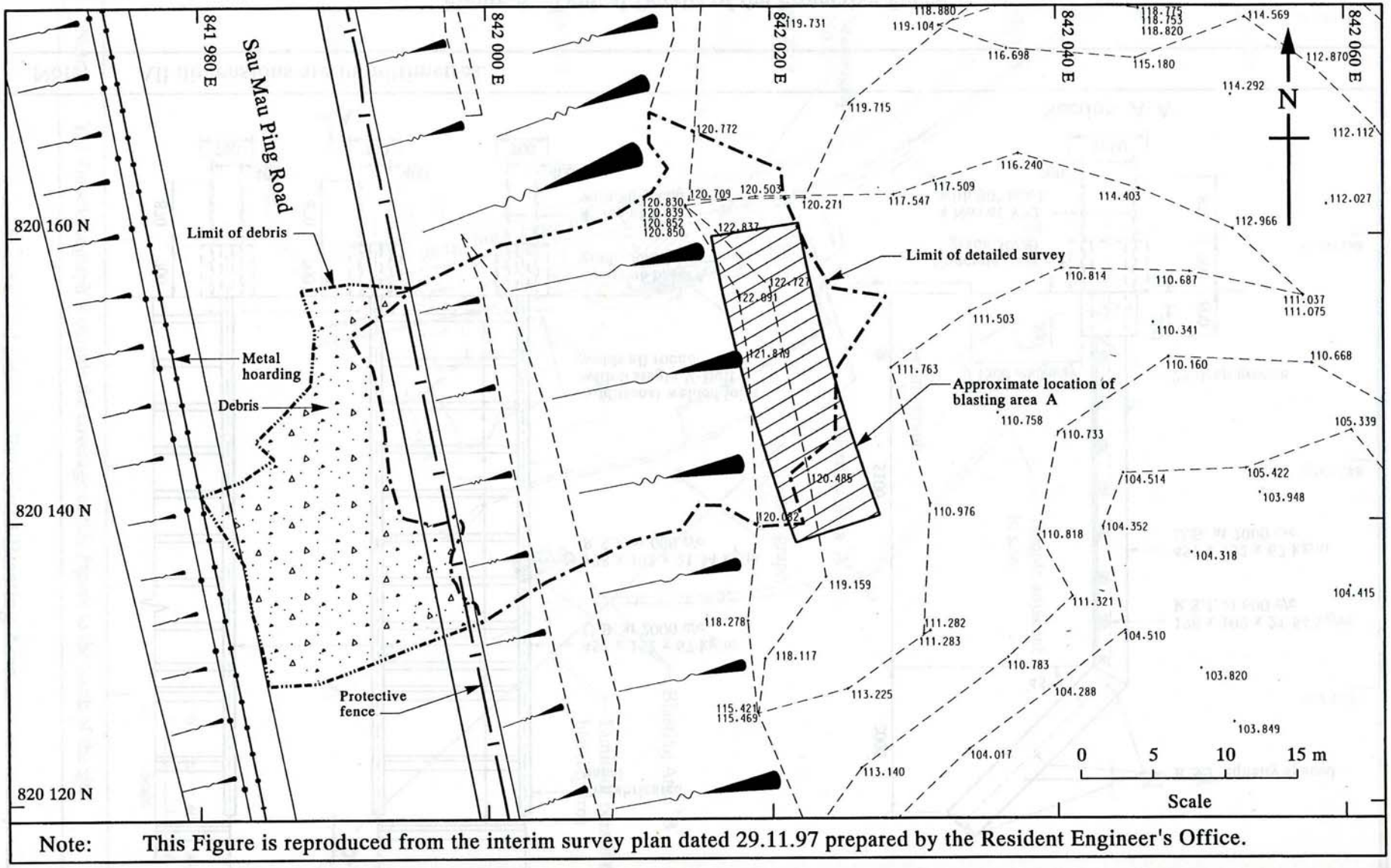


Proposed typical sequence of excavation in rock



Limits of permitted blasting area

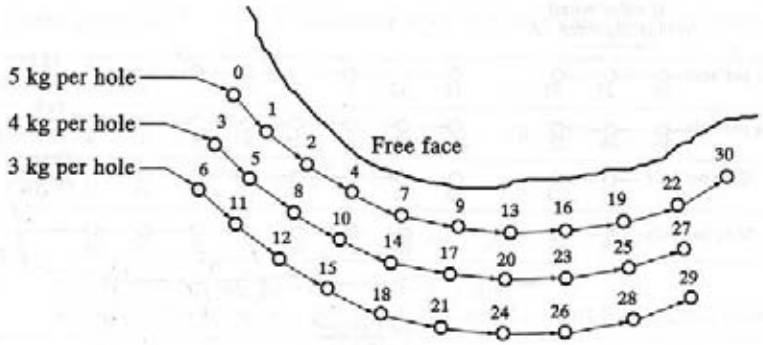
Seismograph No. 2 at about 80m from blasting area recorded max. ppv of 10.6 m/s



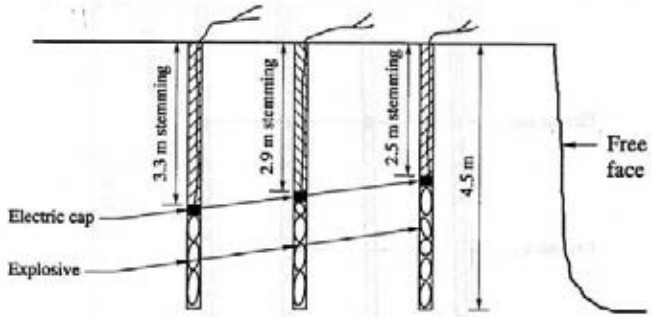
Interim survey of the area close to the crest of the failed slope on 29.11.1997

Blasting requirements

- BAR – allowable max. ppv of 18mm/s; blast direction opposite to Sau Mau Ping Road; natural wall to reduce the effects of blasting on surroundings; temporary closure of portion of Sau Mau Ping Road during blasting; provision of steel vertical screens and steel cages at areas which could pose a public safety risk
- Contract requirements – 20m wide non-blasting zone measured from the slope toe ; 7.1m high temporary protective fence along slope toe



Blast Pattern
(N.T.S.)



Cross Section of Blast Hole
(N.T.S.)

BLAST DETAILS

Bench Height : 4.5 m

Burden : 2 m

Spacing : 2.2 m

Initiation System : Electric

Powder Factor : 0.16 - 0.27 kg/m^3

Charge Weight / Delay : 3 to 5 kg

Delay between consecutive holes : 25 msec

Notes: (1) For location of Blasting Area 'A' , see Figure 7.
(2) The blasting pattern and details were provided by the Contractor.

Details of Blast design

Diagnosis of the failure

- Insufficient burden between the last row of blastholes and crest of failed slope (3m or less) and probably reverse the blast direction towards Sau Mau Ping Road
- Cumulative displacement due to ground vibration alone arising from blasting could not have resulted in the complete detachment of the largest rock block from the slope

Conclusion

- Slope failure triggered by blasting too close near slope crest

CONTENTS OF A BLASTING ASSESSMENT

(a) Site plans clearly indicating the proposed areas of blasting and locations of all sensitive receivers including streets, structures, foundations, railways, public utilities, water mains, drains, sewers, gas mains and other services, geotechnical features such as slopes, retaining walls, boulders, tunnels, caverns, etc. that may be damaged or destabilised by the proposed blasting works.

(b) A report containing the results of a study, including the site topography, geology, ground, groundwater and surface water conditions, and the physical site constraints, sensitive receivers and site history.

(c) A report containing examination of the conditions of the sensitive receivers on and adjacent to the site.

(d) A report containing an assessment of the effects of blasting works to demonstrate that the proposed blasting would not cause any injury to persons or damage to property and sensitive receivers.

(e) Proposals of preventive measures to be carried out for sensitive receivers, if considered necessary.

(f) A list of the alert and cease works limits to be specified for the implementation of blasting works, including blasting vibration limits and air-overpressure limits, etc. to ensure that the blasting works to be carried out would not cause any injury to persons, damage to sensitive receivers, significant disruption to traffic or undue nuisance to the public. The limits proposed shall take into account the existing conditions of all sensitive receivers. The source of the limits and documentary evidence of consultation and agreement, where appropriate, with the key stakeholders (e.g. owners or maintenance agents) of the sensitive receivers shall be provided.

(g) An outline of the blast design to demonstrate that the blasting works could be safely carried out and the proposed limits and any other constraints could be satisfied.

(h) A document setting out methods to be employed, working procedures and sequences for all blasting works, and the safety management system.

(i) Particulars of the site inspections, surveys and monitoring to be carried out to check and measure the effects of blasting, including plans showing the locations of the monitoring stations, the performance criteria and the alert and cease works limits.

(j) Proposals of protective and precautionary measures to be taken, including any evacuation and closure of public areas (such as roads and other facilities) and warnings needed to protect the sensitive receivers and the safety of the public and workers.

(k) Proposals of the arrangement for delivery of explosives to the site to demonstrate the practicability of completing the blasting works and the rock excavation needed within the construction period.

(l) If an on-site explosive store is considered necessary, a report containing an assessment of its feasibility and proposed arrangement.


Blasting Site
Residential buildings
MTR railway
Existing slope
Public road
Flyover

Typical Contents of Blasting Assessment Report

1. Introduction
2. Identification of sensitive receivers
3. Blasting assessment on slopes, retaining walls, structures and utilities
4. Proposed preventive, protective and precautionary measures
5. Environmental considerations
6. Operational considerations
7. Monitoring (vibration, air-overpressure) and instrumentation
8. Conclusions and recommendations

Details of BAR (1)

- 1. Introduction
  - Description of Works
  - Previous Reports
- 2. Identification of Sensitive Receivers
  - Slope, retaining walls, structures and utilities
  - Detail assessment on features within 50 m
  - General assessment on features within 50 m ~ 100 m
  - General description on sensitive receivers within 100 m ~ 300 m

Details of BAR (2)

- 3. Blasting assessment on Slopes, Retaining walls, Structures and Utilities
  - Stability of slopes and retaining walls and their vibration limits
  - Assessment on structures and utilities and their vibration limits
  - Constraint on Blasting
  - Estimate allowable ppv (charge weight per delay)

Details of BAR (3)

- 4. Proposed preventive, protective and precautionary measures
  - Stabilisation works to existing soil and rock slopes before blasting
  - Use of blast cages, vertical screens, blast doors etc.
  - Temporary road closure

- 5. Environmental Considerations
  - Toxic gas, dusts, airblast, possible effects on aircrafts

Details of BAR (4)

- 6. Operation Considerations
  - Nos. of blast per day and time of blast
  - Nos. of blast faces
  - Overnight storage of explosives
  - Delivery of explosives arrangement (route and unloading area)
  - No blast zone
  - Special blasting time
  - Evacuation procedures

Details of BAR (4)

- 7. Monitoring and Instrumentation
  - Monitoring locations and limits
  - Special requirements by authorities
- 8. Conclusions and Recommendations

Blasting Assessment Report
Vibration Estimation

$$PPV = 644 \times (D/\sqrt{W})^{-1.22}$$

(Li & Ng, 1992)

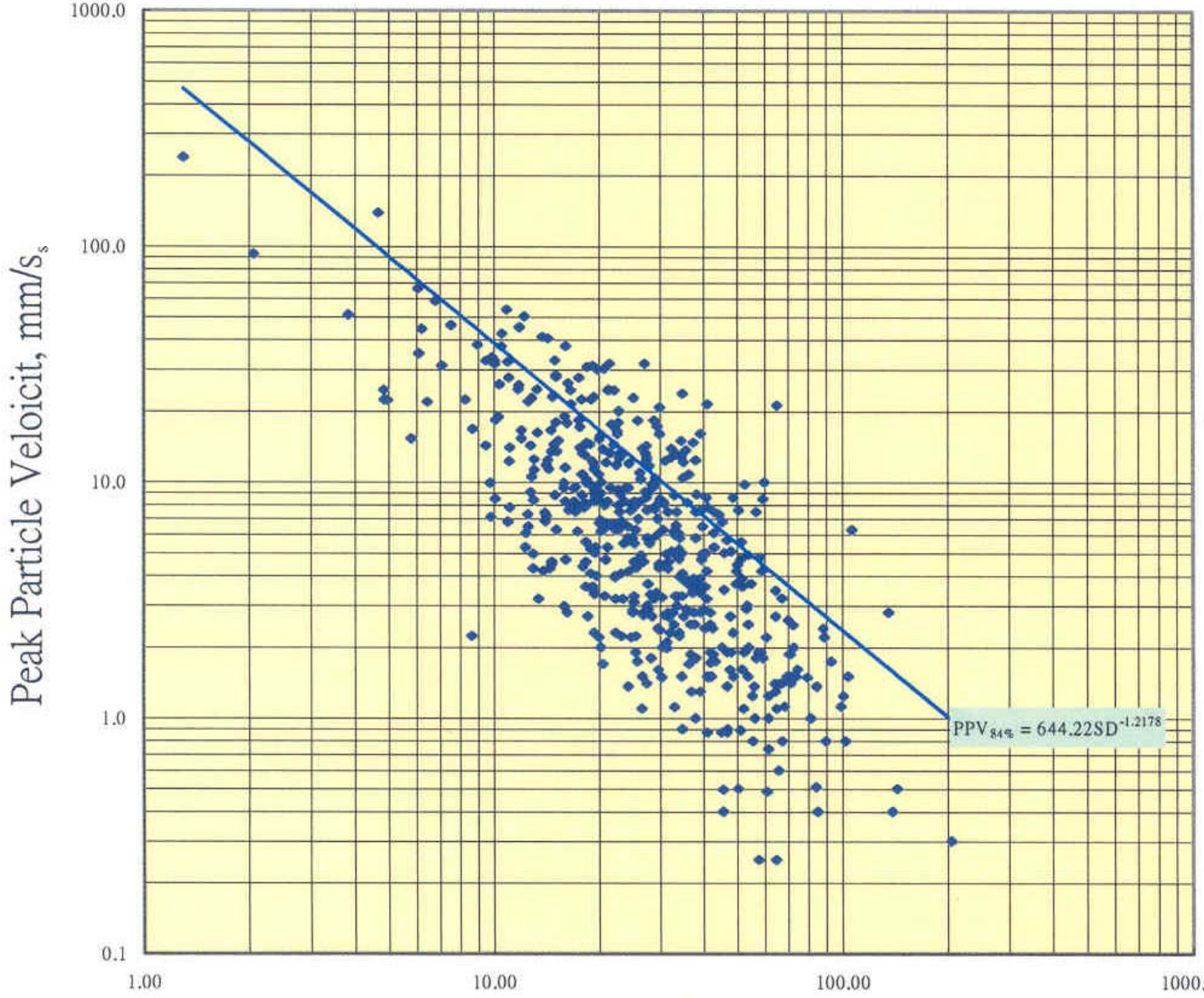
PPV = resultant peak particle velocity (mm/s)

D = distance of interest (e.g. slope, wall, structure, utilities etc.) (m)

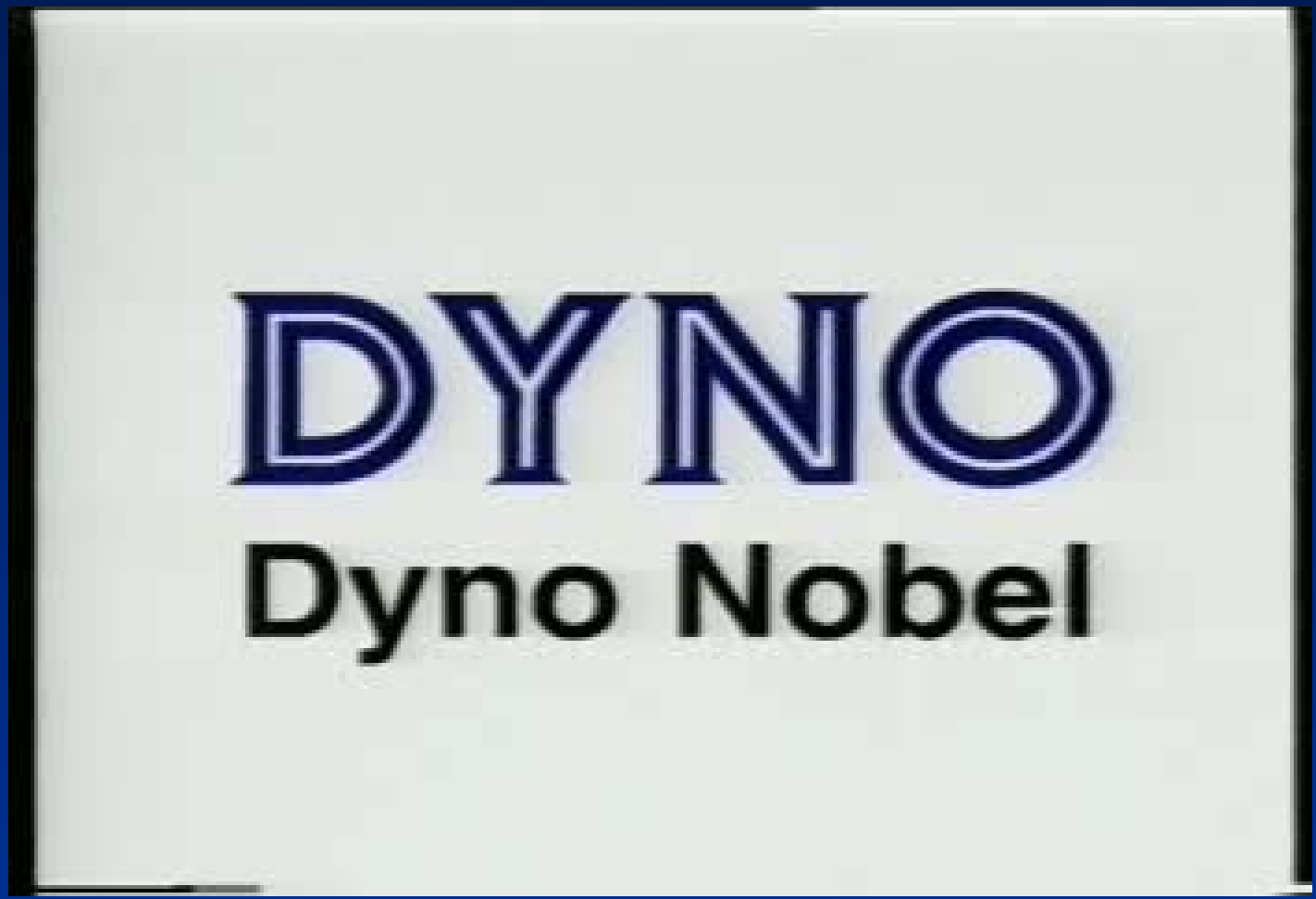
W = weight of explosives per delay (kg)

(Site specific formula may be proposed upon completion of 40 nos. of blasts)

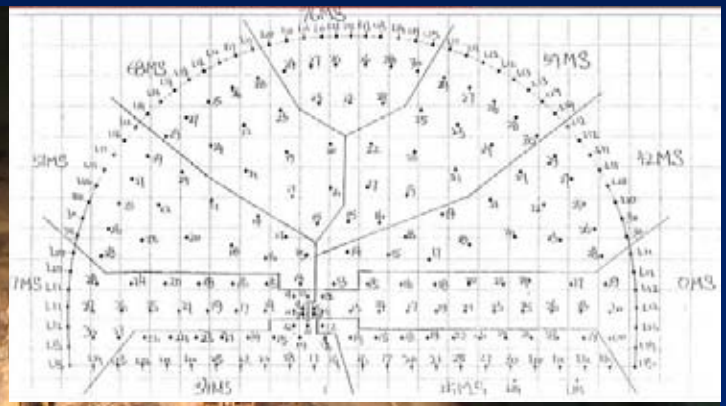
PPV Vs SD


1000.0
100.0
10.0
1.0
0.1
Peak Particle Veloicit, mm/s
PPV84% = 644.22SD-1.2178
1.00
10.00
100.00
1000.0
Square Root Scaled Distance, m/kg^1/2

Tunnel blasting



Blast Hole Drilling



Charging

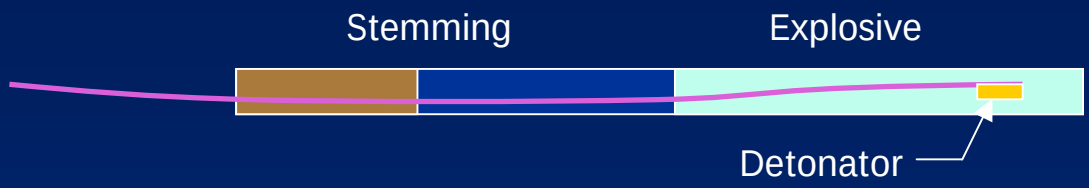
Cartridge explosives

Detonators

Charging bulk emulsion explosives

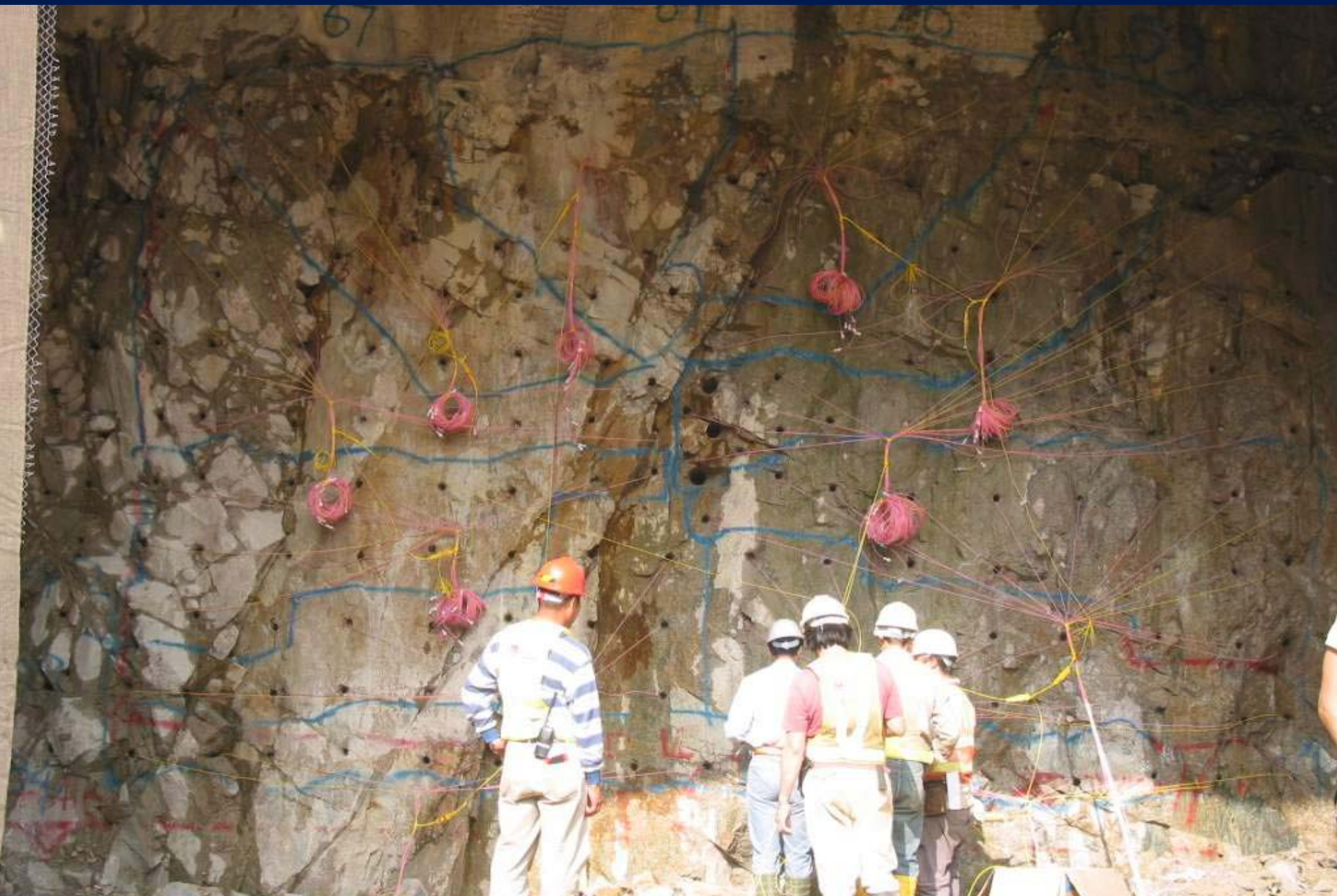
Stemming

- To enhance rock fragmentation



Stemming Material

Tunnel blast face



Hanging wire meshes and rubber mats

Blast doors for tunnel

Case No. 4

Route 3 Country Park Ssection

Tai Lam Tunnel – North Portal

16 May 1996

Tai Lam Tunnel North Portal Site Accident Background information

- 16.5.1996 – A fatal accident arising from a piece of rock fallen from the crown of an unsupported tunnel as a result of blasting at an adjacent tunnel
  - Route 3 Tai Lam Tunnel contains the north bound tunnel, south bound tunnel (each 16m wide x 13m high) and ventilation tunnel (13m wide x 10m high). The 3 tunnels are running parallel to each other at about 13m apart with the ventilation tunnel in between
  - Accident occurred at south bound tunnel when blasting was carried out at ventilation tunnel
  - 2 drilling machine operators and a labourer (deceased) were assigned to drill holes at the rock face of the south bound tunnel for subsequent loading of explosives
  - The blasting area at the ventilation tunnel face was about 21m from the south bound tunnel face
  - Largest rock fragment about 800mm x 500mm x 200mm
  - 4.7kg/delay to 10.5 kg/delay with total 577 kg explosives were used

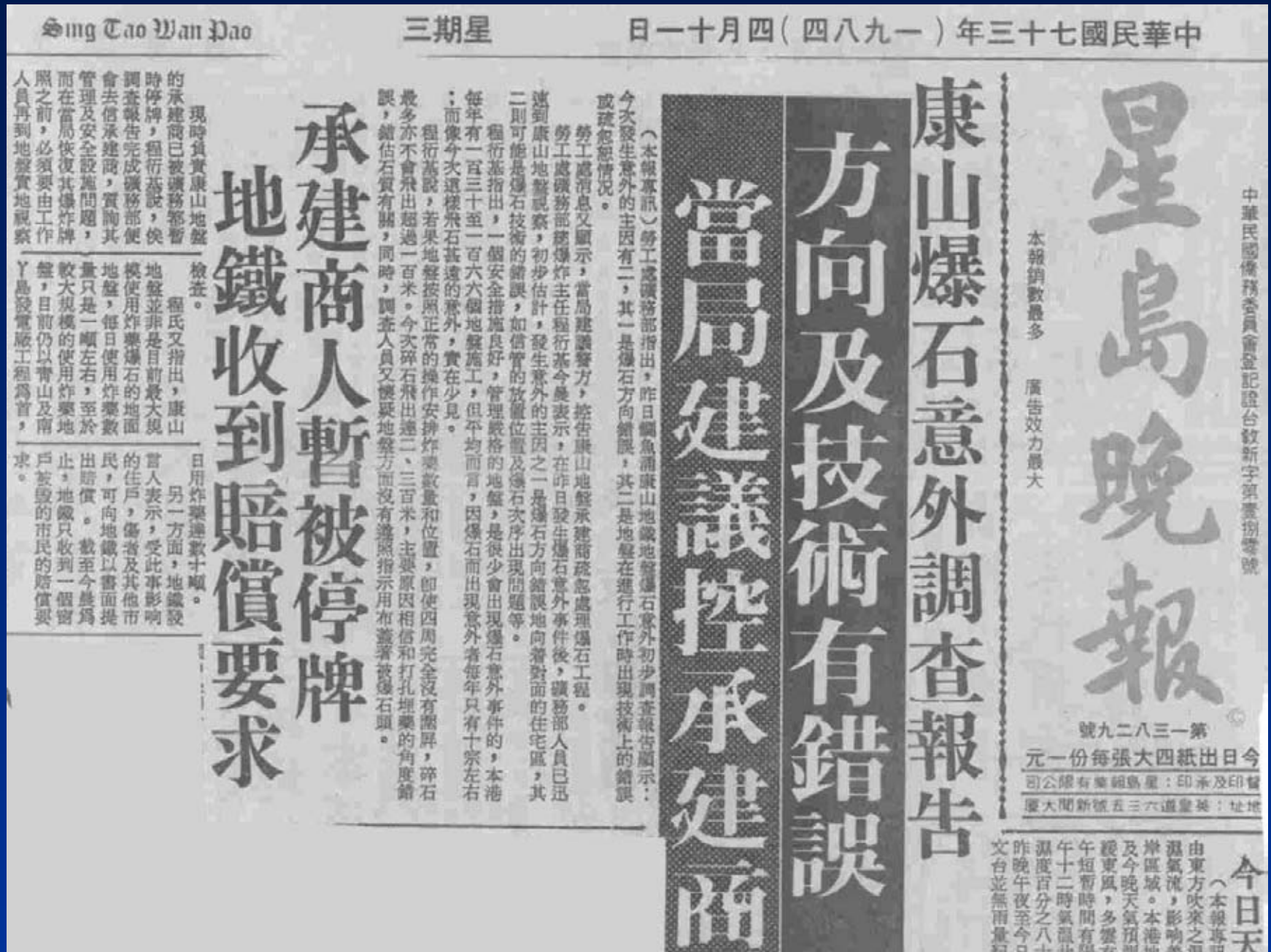
Sequence of events on 16.5.1996

- 3:30 a.m. to 7:10 a.m. – loading of explosives in the ventilation tunnel
- 7:00 a.m. – 2 drilling machine operators and a labourer (deceased) started drilling work at the tunnel face of the south bound tunnel
- 7:15 a.m. – warning siren switched on and all personnel inside the ventilation tunnel were evacuated. Evacuation of all personnel inside the south bound tunnel was not implemented as required.
- 7:20 a.m. – firing of charges
- 7:20 a.m. – the labourer was standing at about 1m from the tunnel face while the 2 drilling machine operators were working inside the drilling machines. The operators reported that they both saw a piece of rock dropping from the tunnel crown, but not certain that it was the piece of rock that had hit the labourer.

Causes of the accident

- Use of excessive amount of explosives – the maximum amount of explosives per delay used for the blast (i.e. 10.095 kg/delay) exceeded the allowable amount of explosives (i.e. 2.04 kg/delay) given in the Blasting Permit condition
- Evacuation of all personnel from the three tunnels before the commencement of any blasting operation was not implemented as stated in the Contractor's Method Statement and set out as Blasting Permit condition
- Poor communication between the Contractor, the shotfirer in charge, the shotfirer, the site foreman and other workers on arrangement of evacuation and their responsibilities
- Lack of efficient communication system between the team of personnel responsible for the execution of evacuation procedure

Newspaper 11 April 1984 – Kornhill Site Flyrock



Sing Tao Wan Pao　三期星　中華民國七十三年（一九八四）四月十一日

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康山爆石意外調查報告

方向及技術有錯誤

當局建議控承建商

承建商人暫被停牌

地鐵收到賠償要求

（本報專訊）勞工處礦務部指出，昨日鯛魚涌康山地鐵地盤爆石意外初步調查報告顯示：今次發生意外的主因有二，其一是爆石方向錯誤，其二是地盤在進行工作時出現技術上的錯誤或疏忽狀況。

勞工處消息又顯示，當局建議雙方，控告康山地盤承建商疏忽處理爆石工程。

勞工處礦務部總爆炸主任程衍基今晨表示，在昨日發生爆石意外事件後，礦務部人員已迅速到康山地盤視察，初步估計，發生意外的主因之一是爆石方向錯誤地向着對面的住宅區，其二則可能是爆石技術的錯誤，如信管的放置位置及爆石次序出現問題等。

程衍基指出，一個安全措施良好，管理嚴格的地盤，是很少會出現爆石意外事件的，本港每年有一百三十至一百六六個地盤施工，但平均而言，因爆石而出現意外者每年只有十宗左右；而像今次這樣飛石甚遠的意外，實在少見。

程衍基說，若果地盤按照正常的操作安排炸藥數量和位置，即使四周完全沒有圍屏，碎石最多亦不會飛出超過一百米。今次碎石飛出達二、三百米，主要原因相信和打孔埋藥的角度錯誤，錯估石質有關，同時，調查人員又懷疑地盤方面沒有遵照指示用布蓋着被爆石頭。

現時負責康山地盤的承建商已被礦務部暫時停牌，程衍基說，俟調查報告完成礦務部便會去信承建商，實施其管理及安全設施問題，而在當局恢復其爆炸牌照之前，必須要由工作人員再到地盤實地視察檢查。

程氏又指出，康山地盤並非是目前最大規模使用炸藥爆石的地面地盤，每日使用炸藥數量只是一噸左右，至於較大規模的使用炸藥地盤，目前仍以青山及南丫島發電廠工程爲首，日用炸藥達數十噸。

另一方面，地鐵發言人表示，受此事影響的住戶，傷者及其他市民，可向地鐵以書面提出賠償，截至今晨爲止，地鐵只收到一個窗戶被毀的市民的賠償要求。

今日天

（本報專訊）由東方吹來之濕氣流，影響岸區域。本港地及今晚天氣預測緩東風，多雲有午短暫時間有陣午十二時氣溫北濕度百分之八十昨晚午夜至今日文台並無雨量

Newspaper 9 June 1987 - Lei Yue Mun Site Flyrock

〔1〕本港新聞①

新報 HONG KONG DAILY NEWS

觀塘鯉魚門道開山地盤爆石有意外

石塊飛越三百米 擊毀學校及民居

石塊穿窗射入 一名女生傷額

八扇窗門被毀校內滿地石頭

本報資料

地盤爆石須依規定 砲王負責一切事宜

近年曾經發生過兩宗爆石意外

康田苑七單位窗框傢俬被毀

兩部私家車亦遭擊中

新報

HONG KONG DAILY NEWS
ESTABLISHED 5 OCT. 1959
ABC 1986年平均每日實銷 118,226份
發行者：新報有限公司
承印：康華印務所
地址：香港鰂魚涌英皇道444號 香港工業大廈17樓
新聞部電話：5-8160261 5-8160861
體育消息：5-8160742
廣告部：5-8160261

十五民國七十六年 六月 10 星期三 丁卯年五月十五日

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・今日要聞・

藍田爆石發生意外 學校民居均被擊毀

事務隊員拘捕小販 被指施暴遭眾包圍

藍田走鬼起衝突 千人包圍事務隊

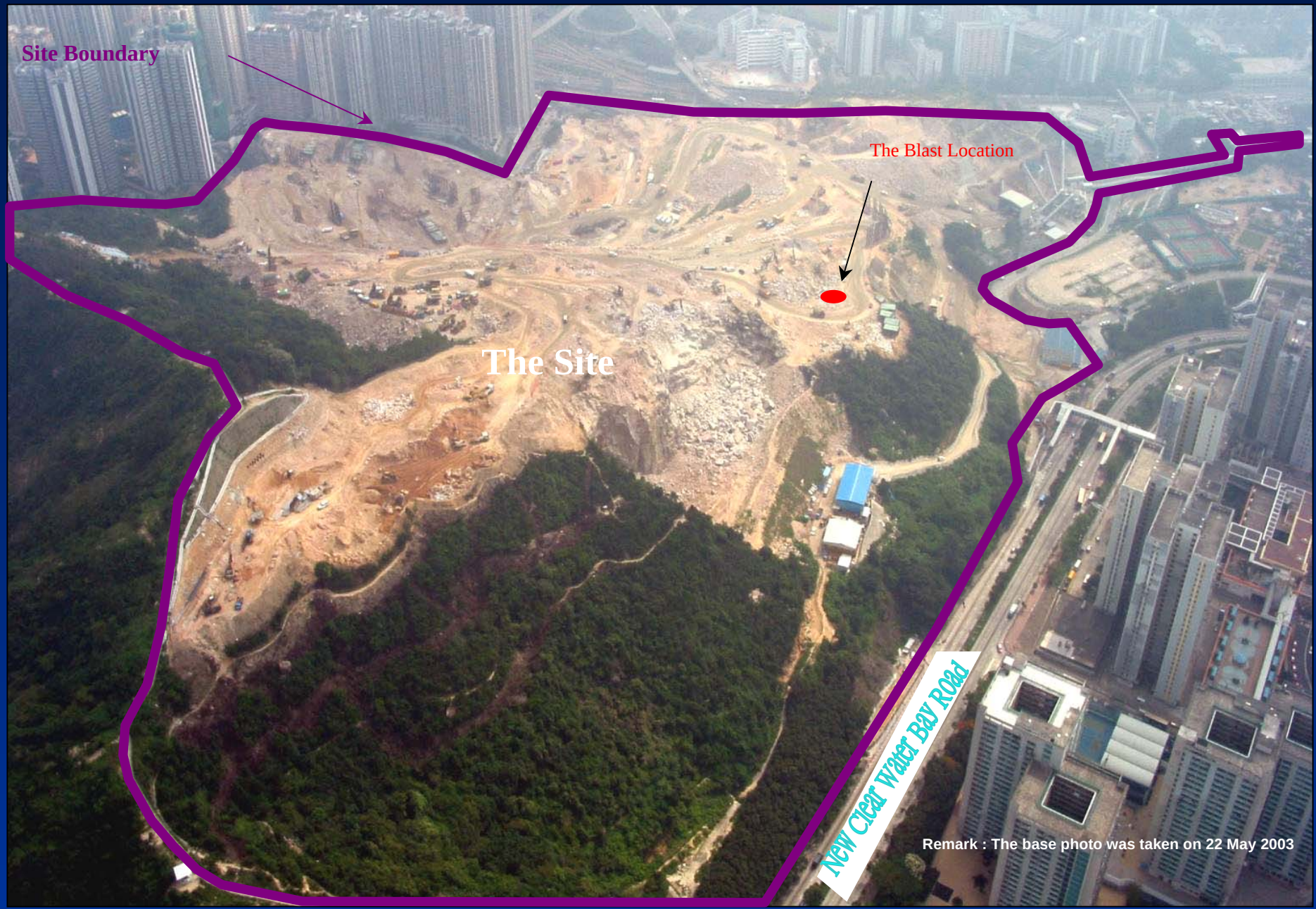
指事務隊員將小販鎖起毆打

四兄弟齊遭狂打 事務隊亦稱有傷

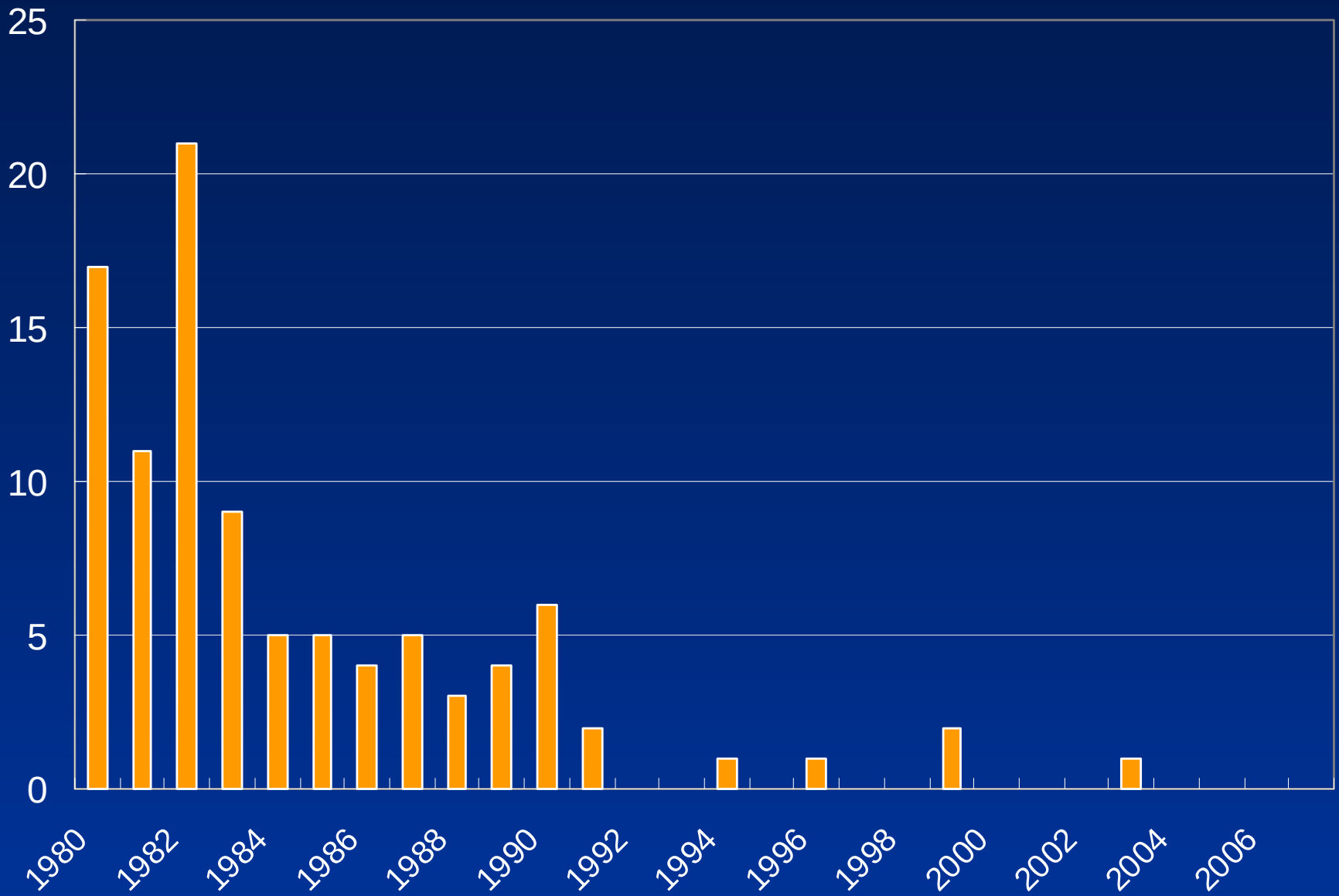
礦務部主任到地盤調查

Site formation project flyrock incident 6 June 2003

Site formation project flyrock incident 6 June 2003



Blasting accident statistics 1980 - 2006



Blasting accident summary

Year	No. of accidents	Casualty
1991	2	1 death + 1 injury
1992	0	0
1993	0	0
1994	1	4 minor injuries
1995	0	0
1996	1	1 death
1997	0	0
1998	0	0
1999	2	4 minor injuries
2000	0	0
2001	0	0
2002	0	0
2003	1	9 minor injuries
2004	0	0
2005	0	0
2006	0	0

End