

# **Asphalt Pavement Recycling for Hong Kong**

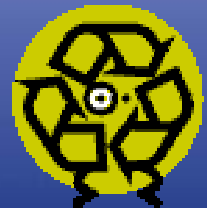
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**Seminar on Road Pavement Recycling  
Warsaw, 10-11 October 2002**

**Richard Elliott**

**Dr Daru Widyatmoko**

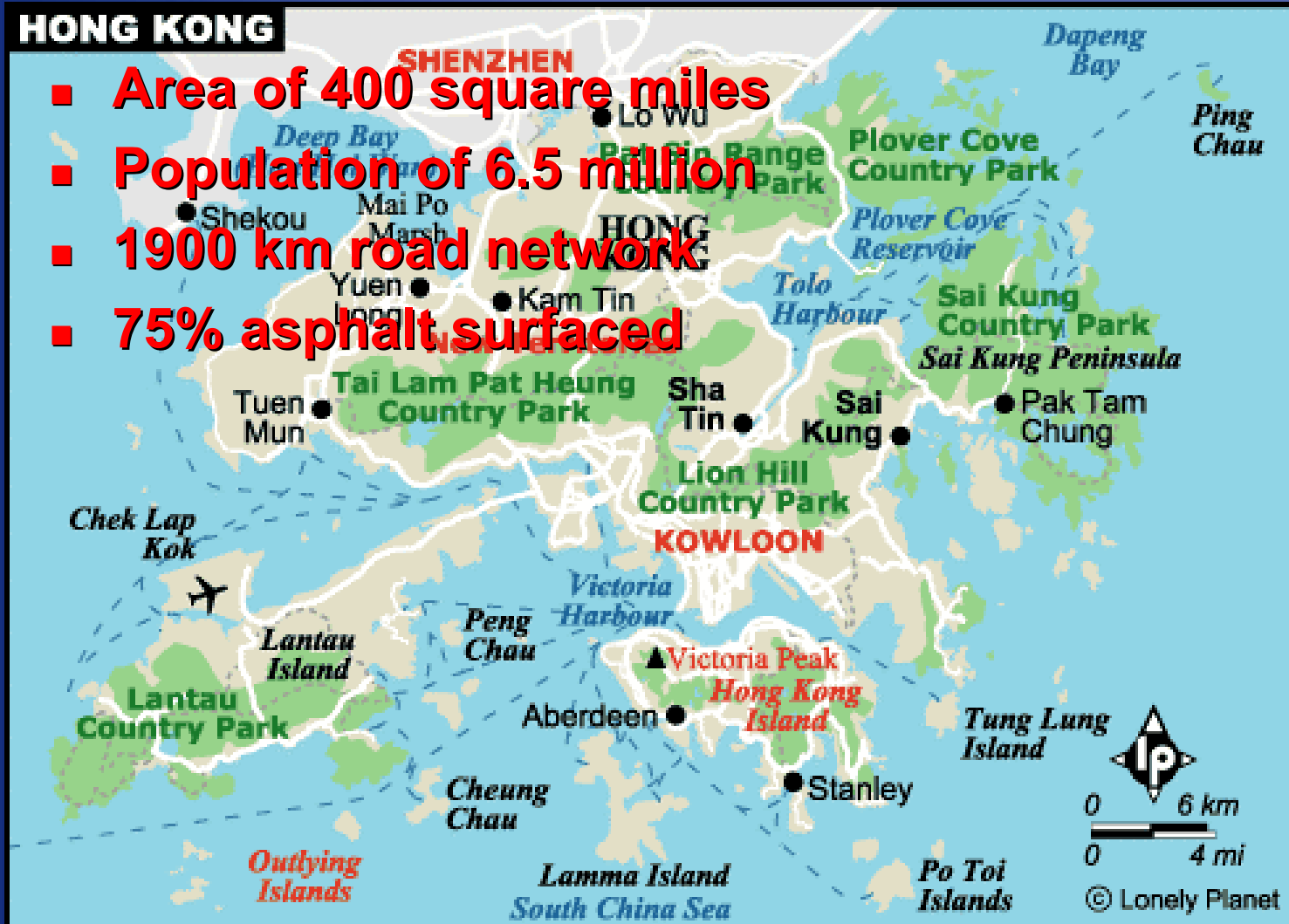
**Scott Wilson Pavement Engineering**



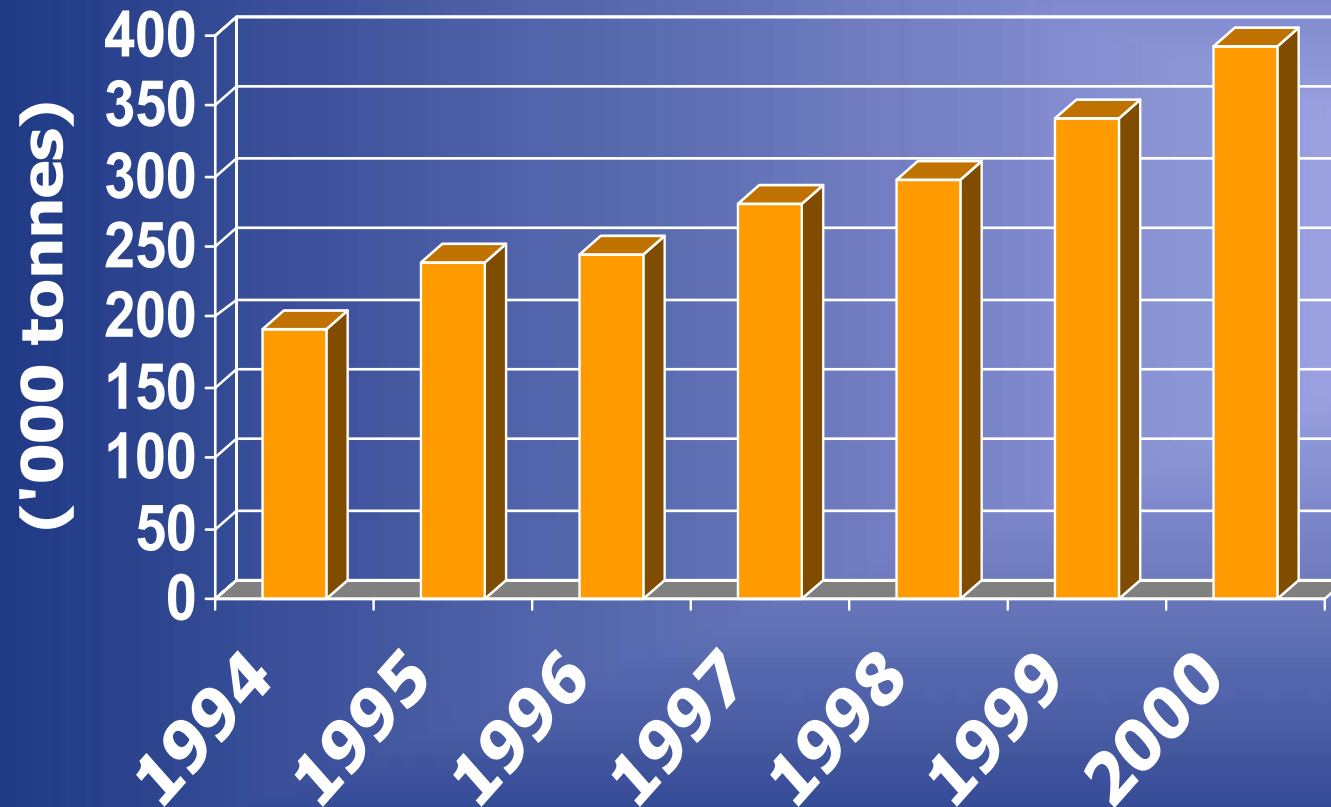
# The Special Administrative Region of Hong Kong

## HONG KONG

- Area of 400 square miles
- Population of 6.5 million
- 1900 km road network
- 75% asphalt surfaced



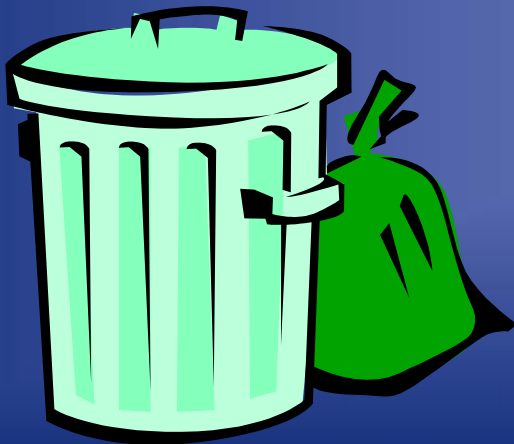
# Flexible Pavement Waste – A Growth Industry



# The Waste Reduction Challenge – (HK is About Making Money!)

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- To find ways to make money by conserving resources
- To forge “win-win” partnerships between key stakeholders



# Construction & Demolition Waste

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- Hong Kong produces 12.0m tonnes each year!
- Australia (three times Hong Kong's population) produces 6.5m tonnes
- Pavement waste is only a small part (3%) of Hong Kong's C&D waste volume

# Recycling Pavement Waste in Hong Kong

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Pavement  
Engineering

- Ideal environment for recycling
- Small, densely populated area
- Immense competition for available land
- HK surfacing very consistent



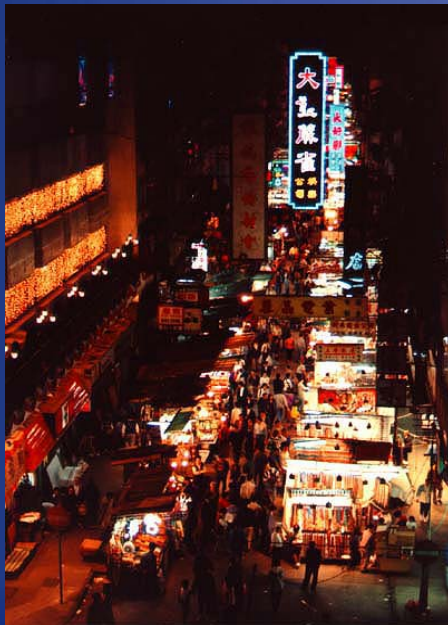
# Asphalt Pavement Recycling for Hong Kong

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- **Project duration: June 2000 to March 2002**
- **Literature Review**
- **Workshop in Hong Kong**
- **Preliminary Guidelines**
- **Laboratory Assessment**
- **Preliminary Catalogue of Designs**

# Appropriate Processes for Hong Kong

- Structural pavement failure rare
- Close proximity of residential and commercial properties
- Complex geometry and topography
- → Hot in Plant Recycling (HIPR)



# Workshop in Hong Kong

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- Interviews with key stakeholders
- Suitability of HPR confirmed
- “Breakout Sessions” in 3 sub-groups



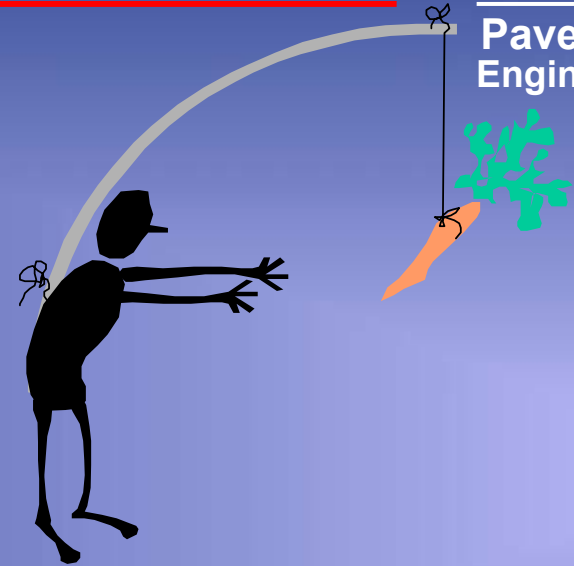
# Group A – Policy and Planning: Issues

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- “Carrot” and “Stick”
- Selection and storage of RAP
  - Cheaper land!
  - Co-ordination by EPD
- Development of a suitable specification



# Group B – Specification, Design, Compliance: Issues

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- Site investigation and materials testing
- Small % RAP: little change required
- Large % RAP: binders / rejuvenators / plant currently unavailable
- Maintenance work/ low % RAP: recipe  
Major work / high % RAP: performance



# Group C – Minimising Excess Supply: Issues

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- Co-ordinated approach by Government (HyD, TD, EPD)
- Cultural change
- Alternative uses for RAP (e.g. in concrete)
- Longer lasting pavements

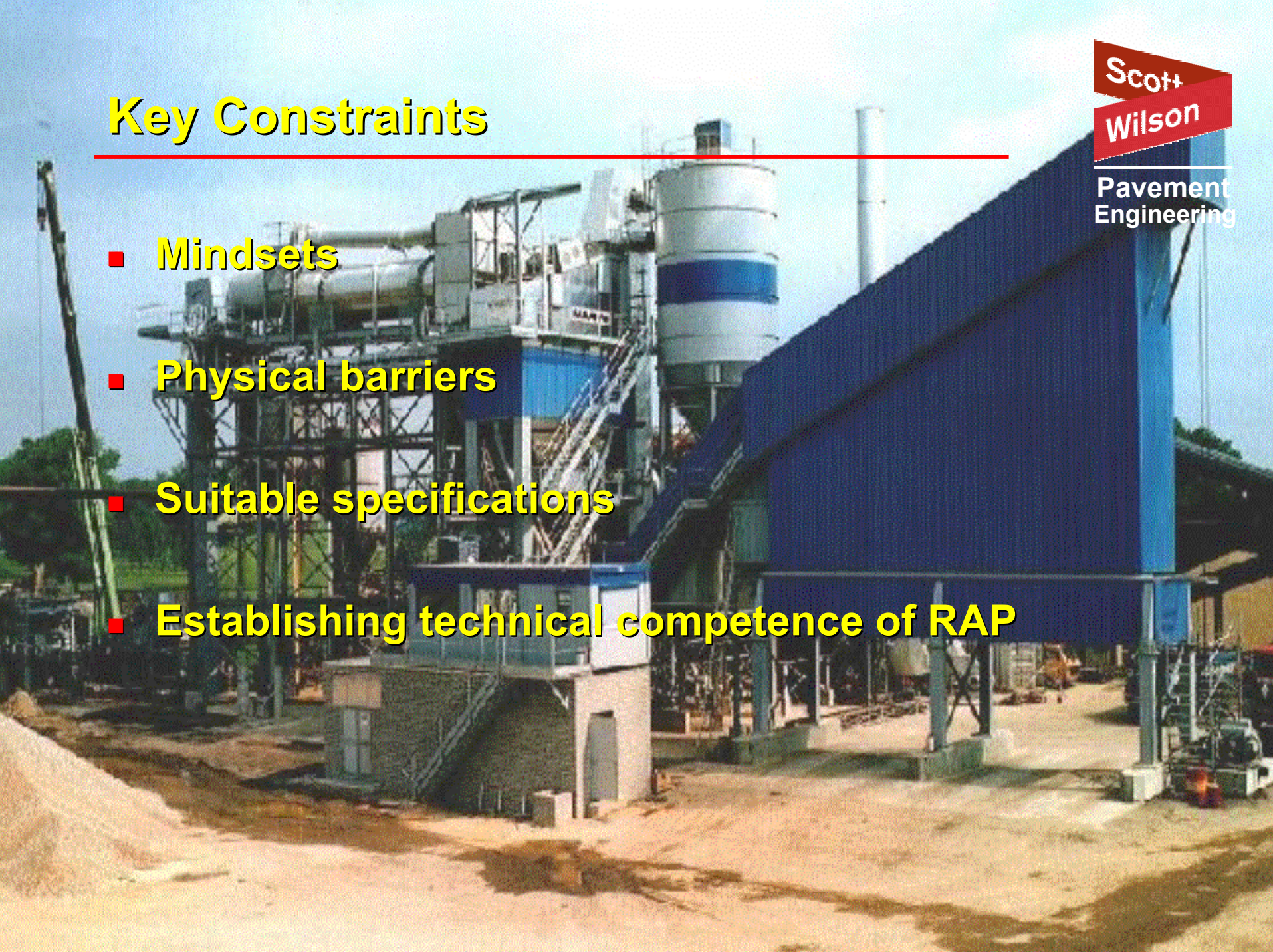
# Key Constraints

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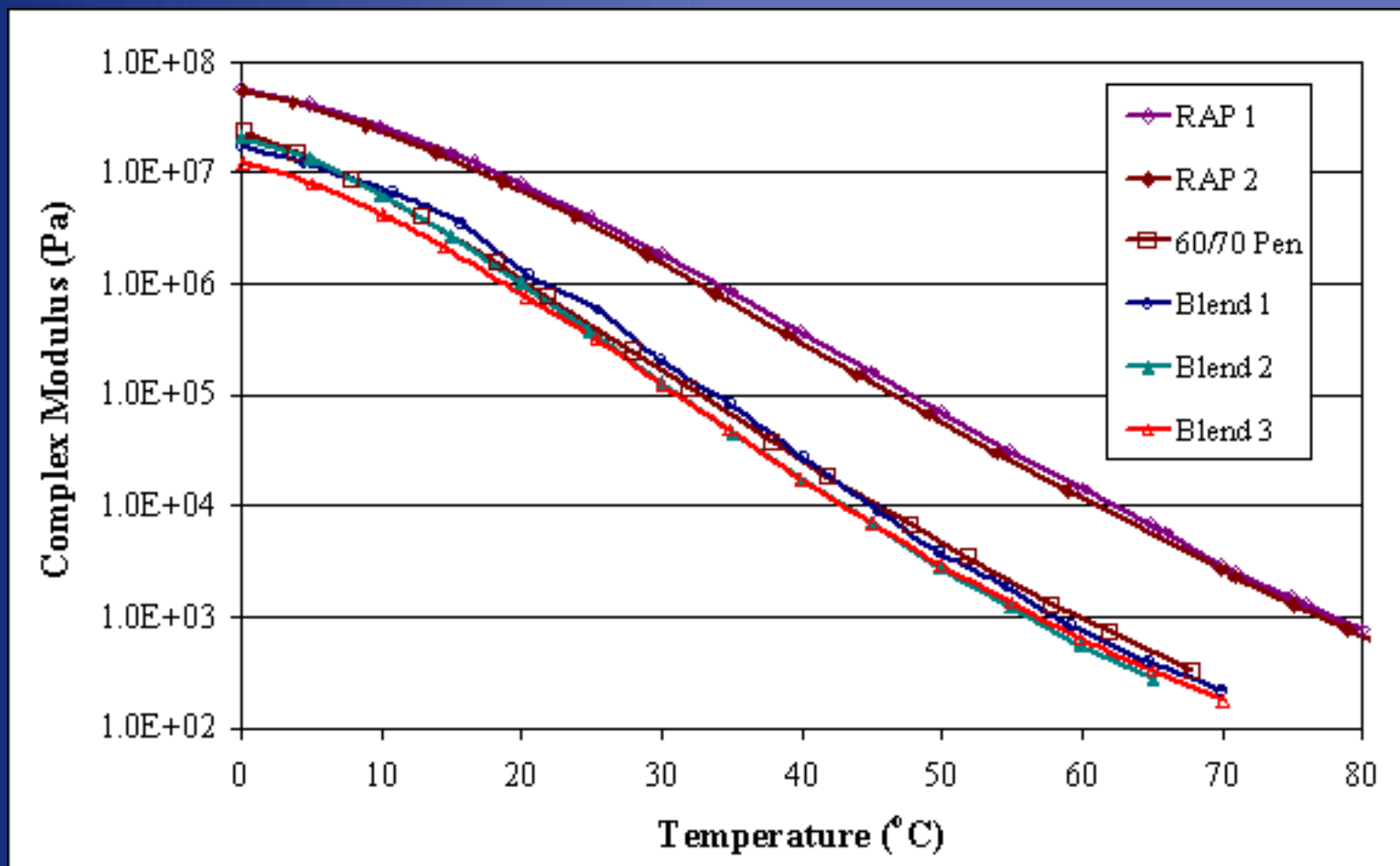
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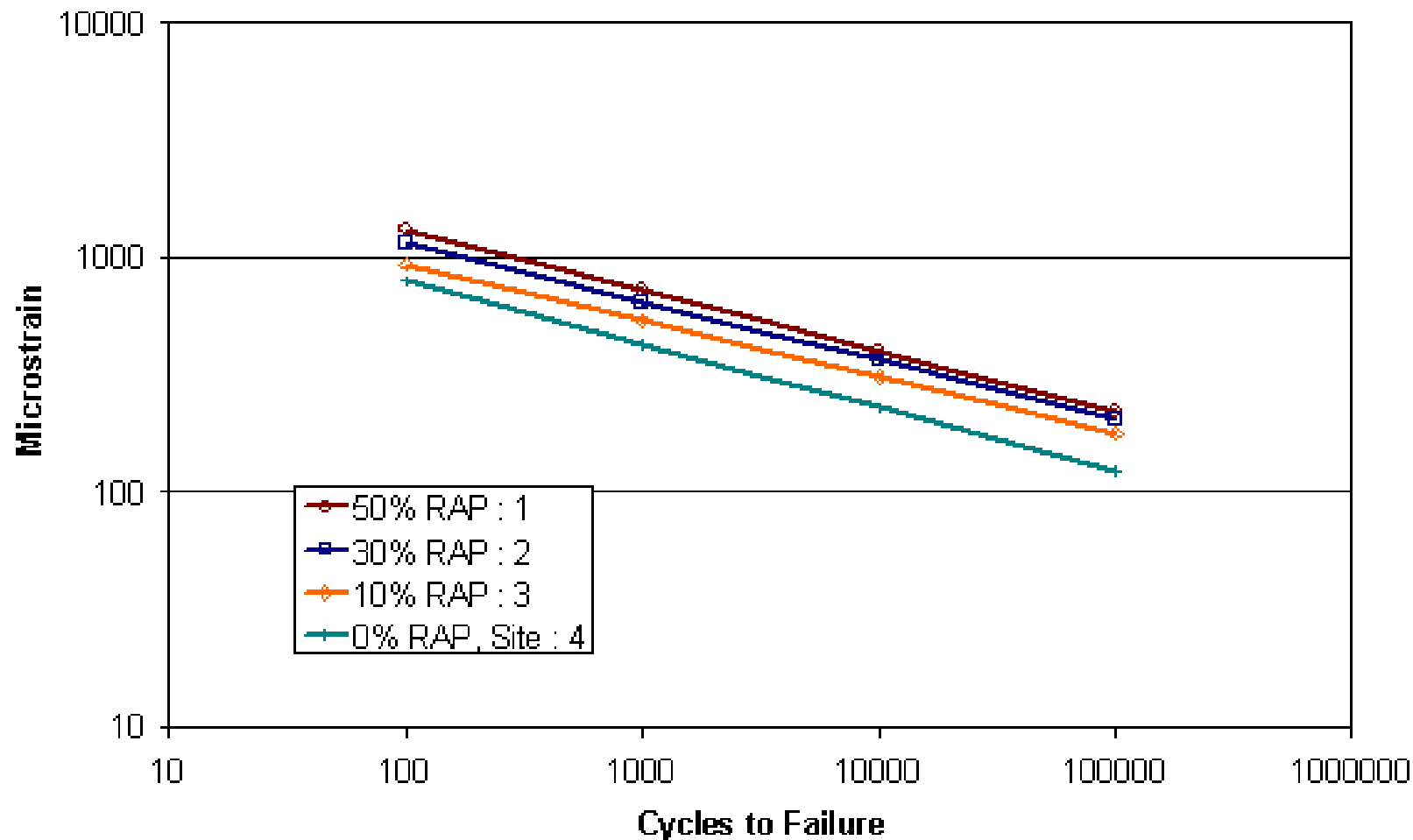
- **Mindsets**
- **Physical barriers**
- **Suitable specifications**
- **Establishing technical competence of RAP**



# Laboratory Testing: Binder Properties



# Laboratory Testing: Mixture Fatigue



# The Hong Kong Asphalt Market

- 1.2 million tonnes / annum
- 4 suppliers
- Approximately 50/50 new/maintenance
- Prior to 1998, no suppliers with dedicated asphalt recycling capability



# Government Policy

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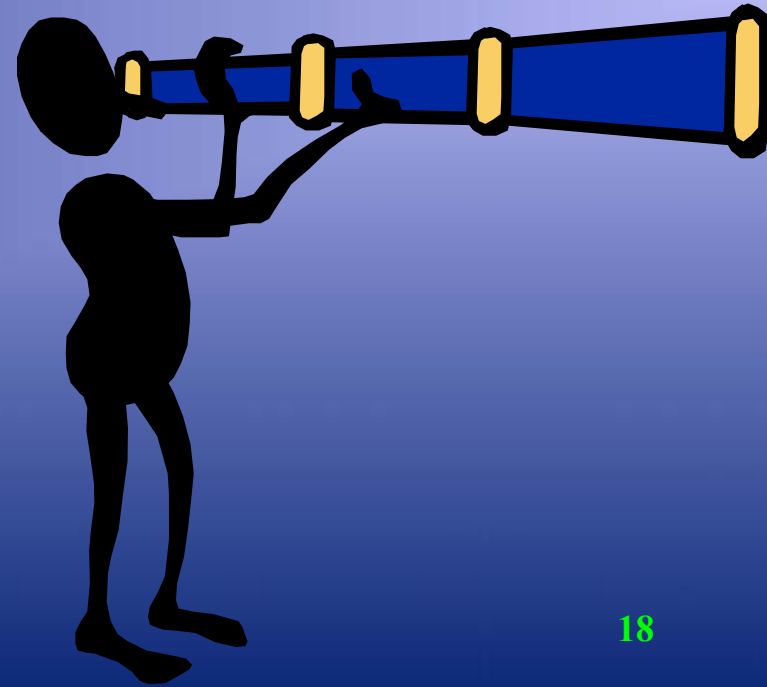
***“The environment is an important part of  
Hong Kong’s future development”***

***Tung Chi Wah, Chief Executive, HKSAR, 1998***



# One Contractor's View

- In 1998, Anderson Asphalt decided their next plant would have recycling facility
- Invested HK\$20m in double drum batch plant (conventional HK\$14m)
- Incorporation of 60% RAP possible



# Implementation

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- **First steps : 1<sup>st</sup> August 2002**
  - Up to 15% RAP in (road) base
  - Draft Particular Specification
  
- **RAP in other layers to follow as experience gained**

# Full Scale Trials



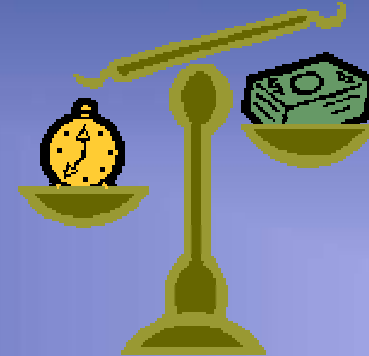
Pavement  
Engineering

- Rehabilitation / widening of major HK highway in 2003
- 5700 m<sup>3</sup> RAP to be recycled in base (binder) / roadbase (base)
- Landfill costs of HK\$ 712,500 saved
- Reduced transport / air pollution

# One Contractor's View

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- Sums do not add up – yet!
- Slow, conservative market
- Some initiatives have not materialised (e.g. premium for using RAP)
- Long term initiative - others will follow



# Client's View (HyD)

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- **Conventional contracts**
  - Risk with Government
- **Move to performance testing and contractual risk sharing**
  - → Greater utilisation of recycling

**Remember:**

**“Every grain of rice in a bowl  
counts”**



An aerial photograph of a vast, rolling mountain landscape. The mountains are covered in dense, vibrant green vegetation, likely a tropical forest. The terrain is characterized by smooth, rounded peaks and deep, shadowed valleys. In the lower center of the image, a small, densely packed village is visible, nestled in a valley. The village consists of numerous small, light-colored buildings with dark roofs. The sky above is a clear, bright blue, dotted with soft, white clouds. The overall scene conveys a sense of natural beauty and tranquility.

**THANK YOU!**