

New Civil Engineer

nce

www.nceplus.co.uk

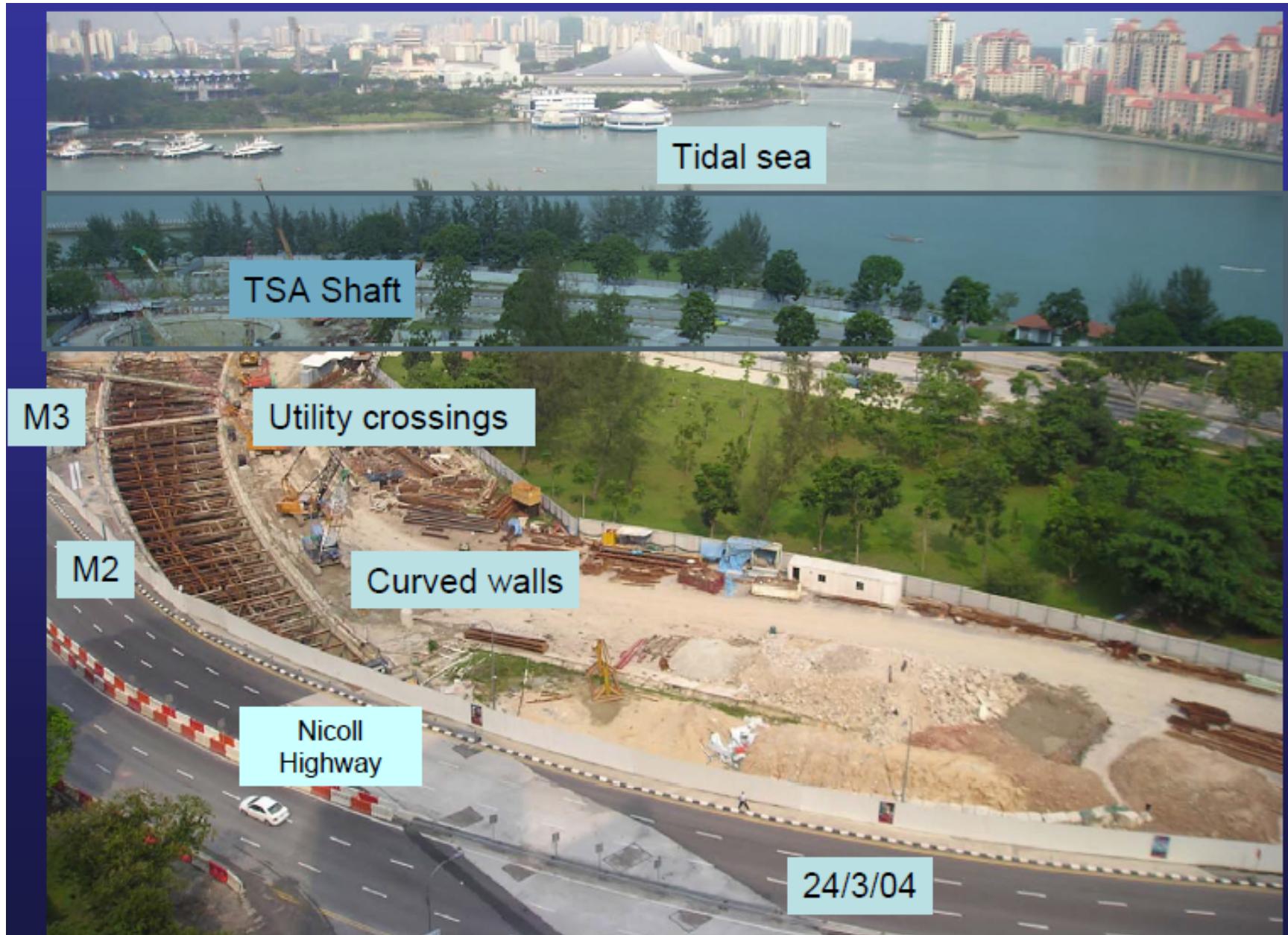
Magazine of the Institution of Civil Engineers
29 April 2004

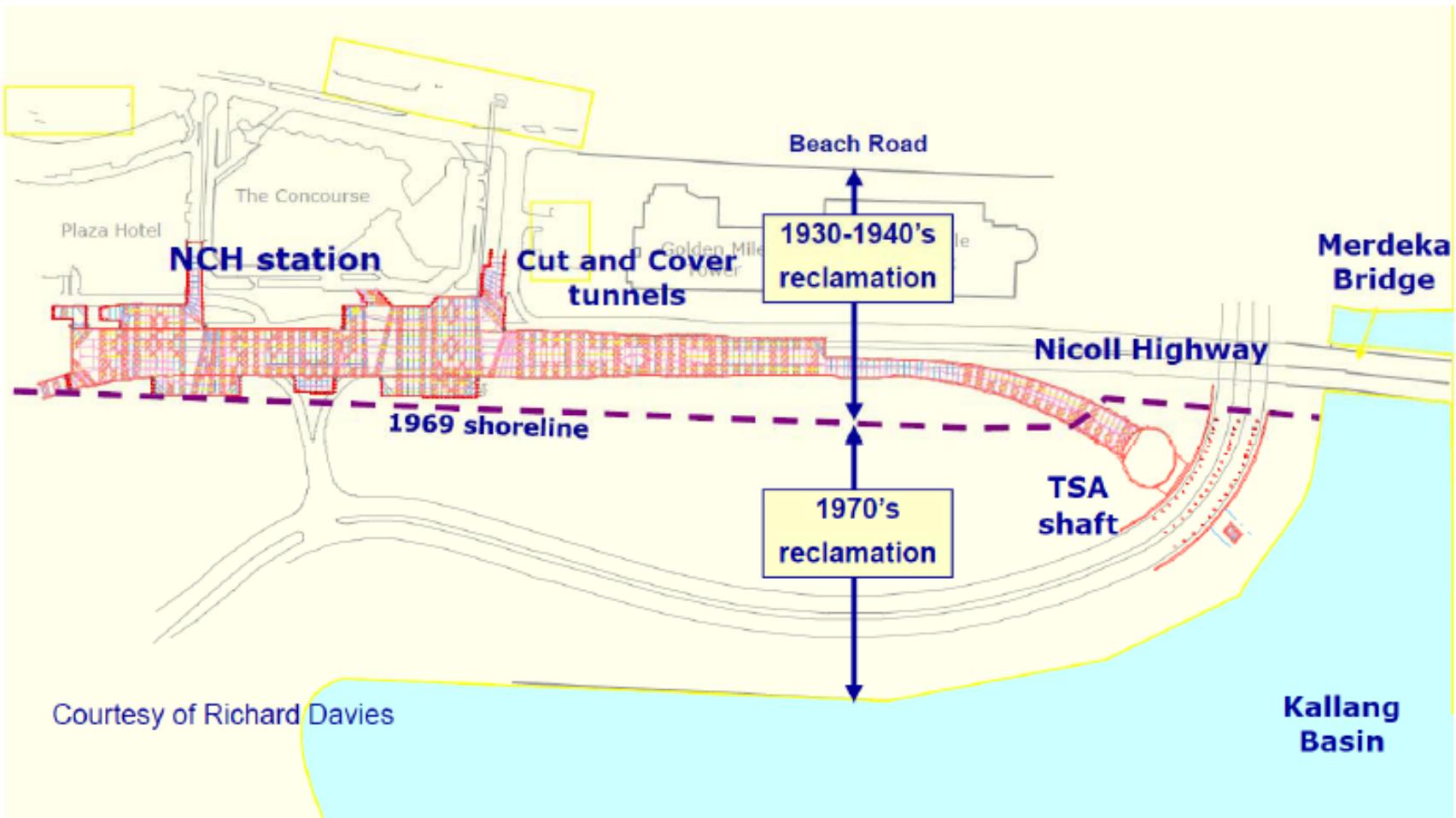
Singapore cut and cover collapse

Krishna Kumar
Based on Presentations by
Prof. Soga, D.W. Hight
and NCE Report



Nicoll Highway, Singapore







3.33pm



3.33pm

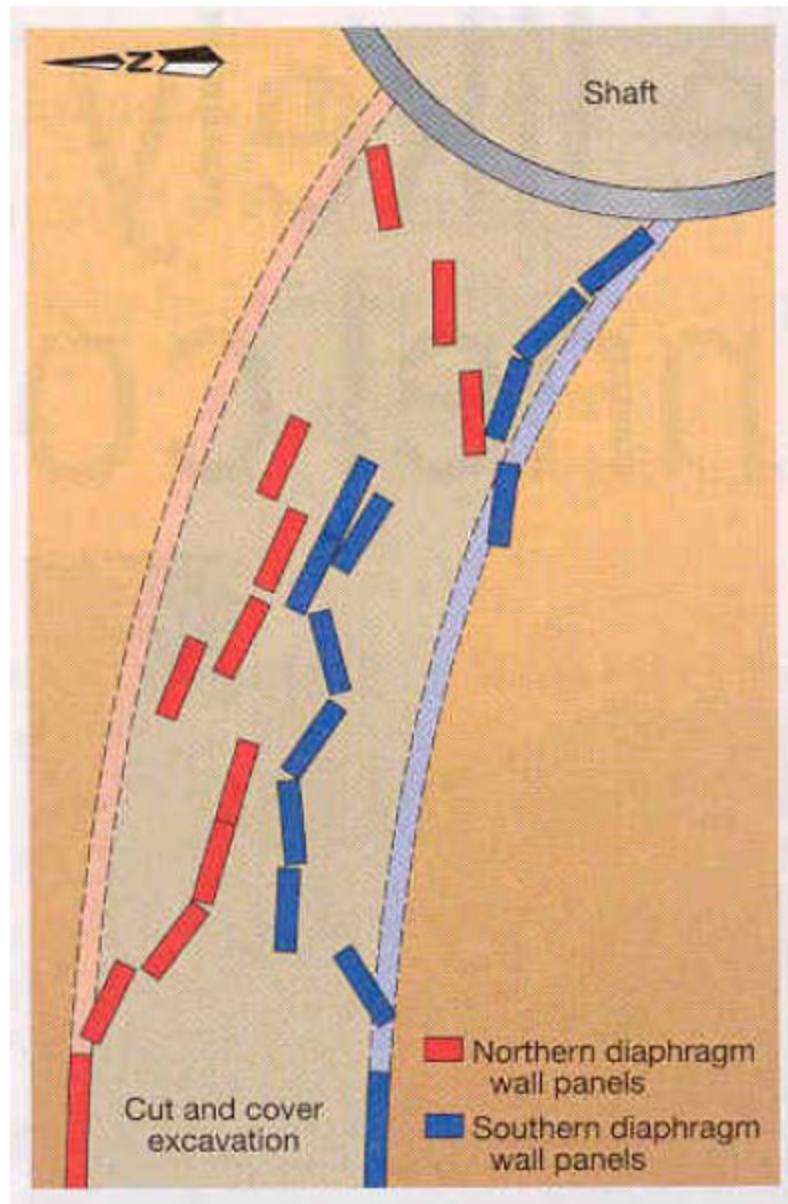


3.34pm



3.41pm

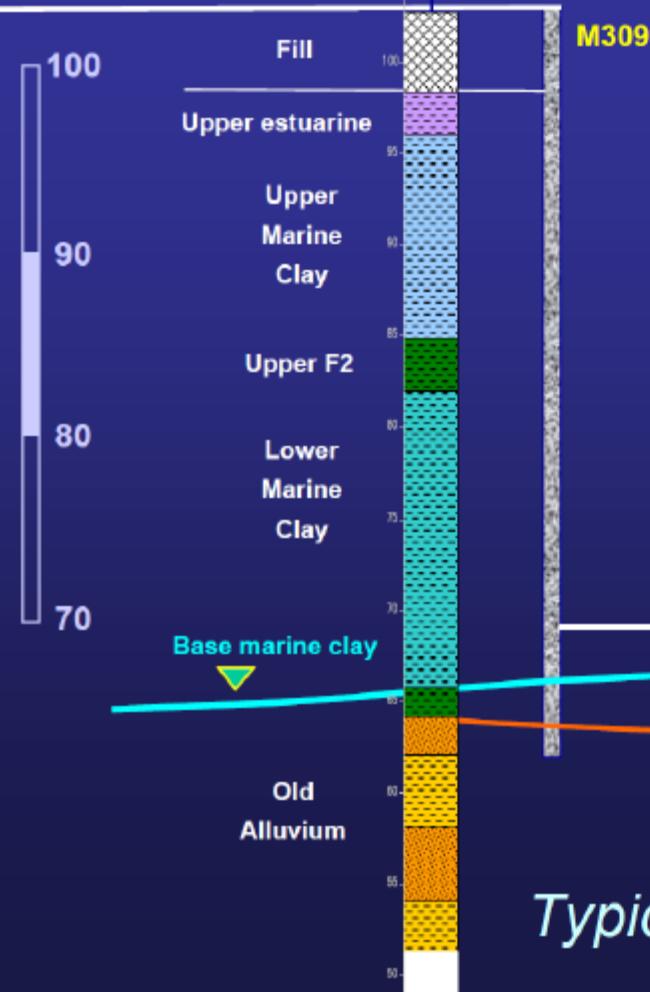




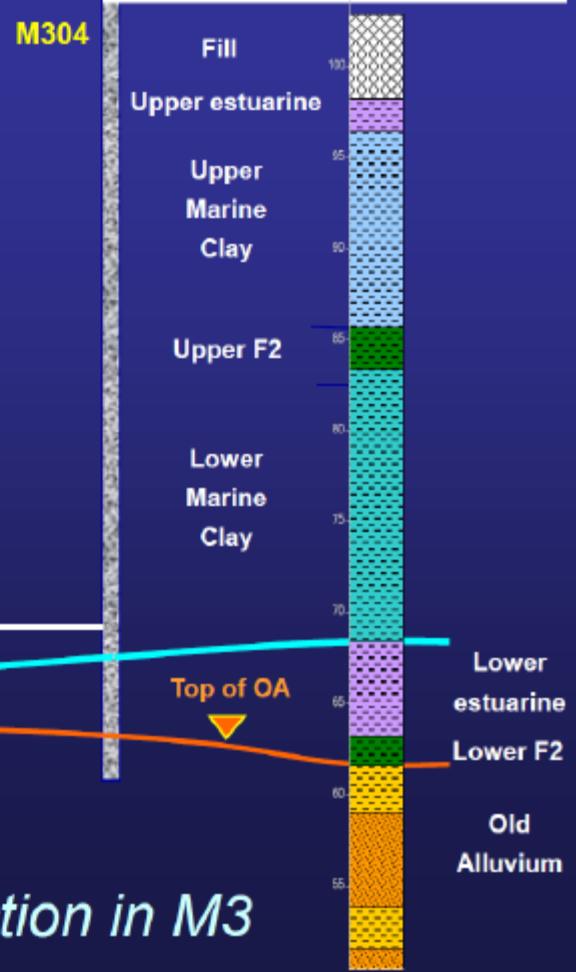


SOUTH

ABH 31

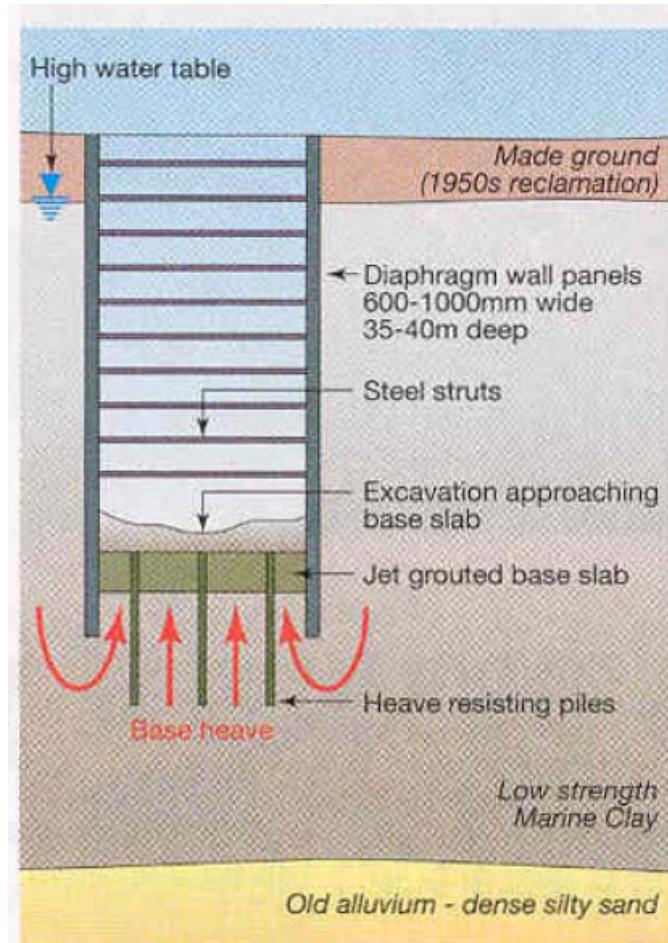


ABH 32 NORTH

*Typical section in M3*

Reasons for collapse

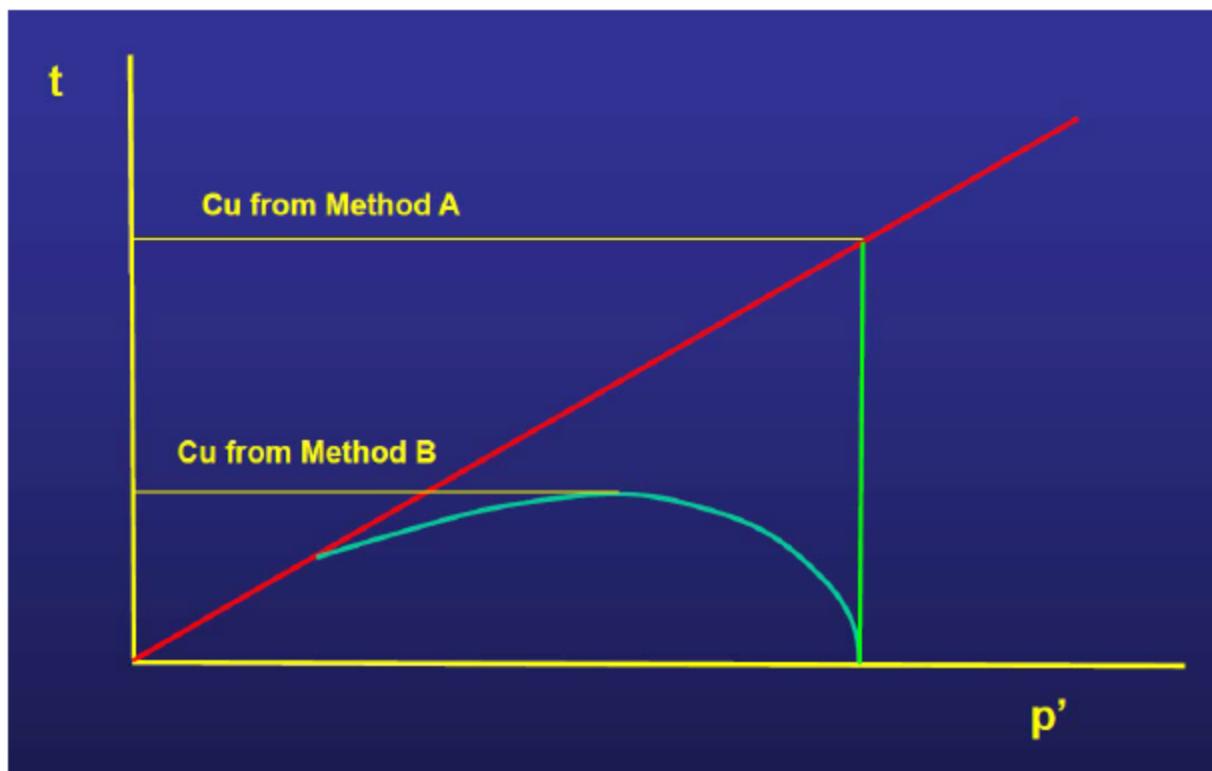
- Problem with **Jet grouting** at the base slab.
- Struts design – connector
- Use of **effective stress parameters** to do undrained excavation.

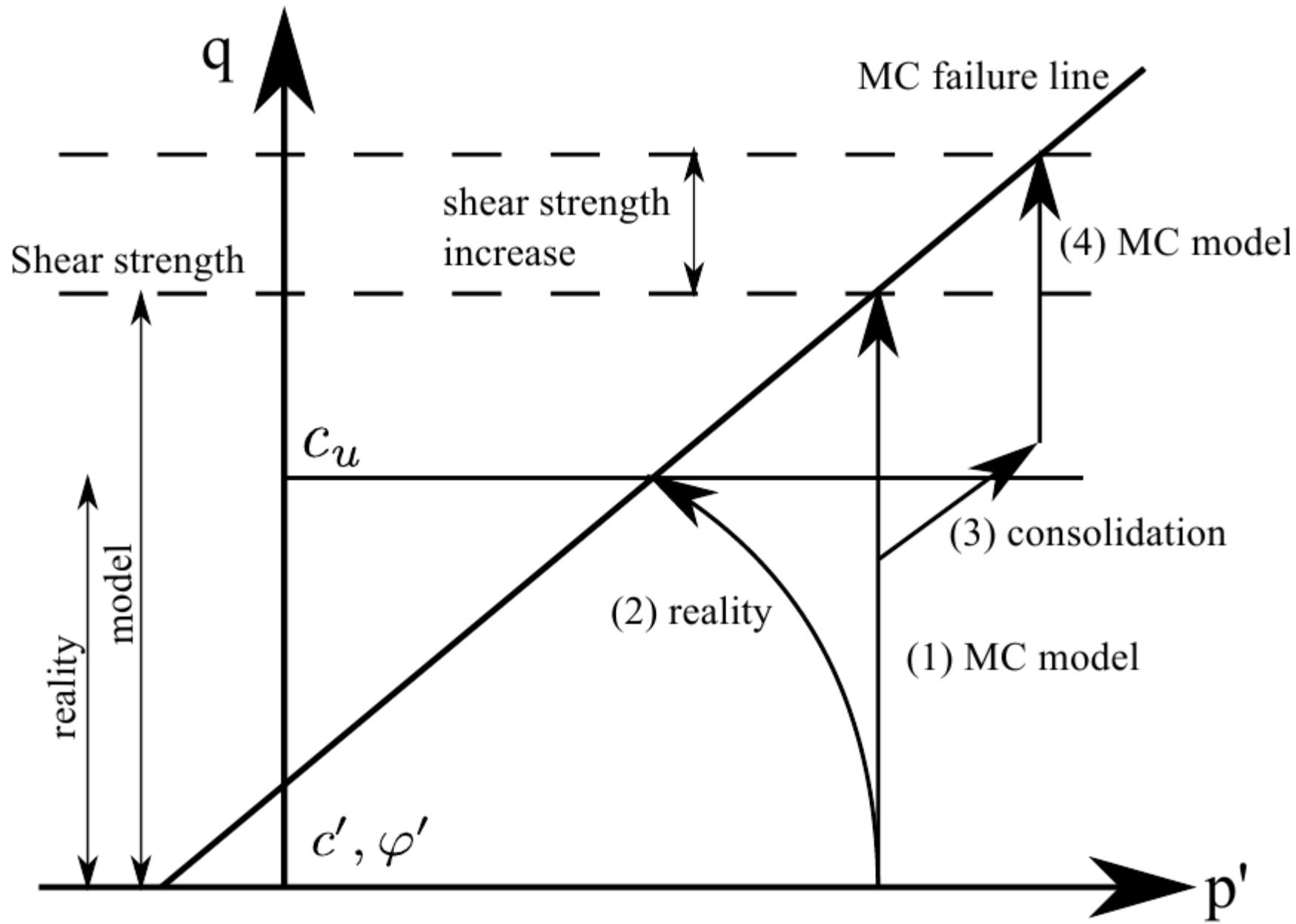


Undrained Analysis

- Method A and Method B refer to two alternative ways of modelling undrained soil behaviour in Plaxis
- **Method A is an effective stress analysis** of an undrained problem assumes isotropic elastic behaviour and a Mohr-Coulomb failure criterion
- As a result mean effective stress p' is constant until yield
- Method A was being applied to marine clays which were of low over-consolidation or even under-consolidated because of recent reclamation

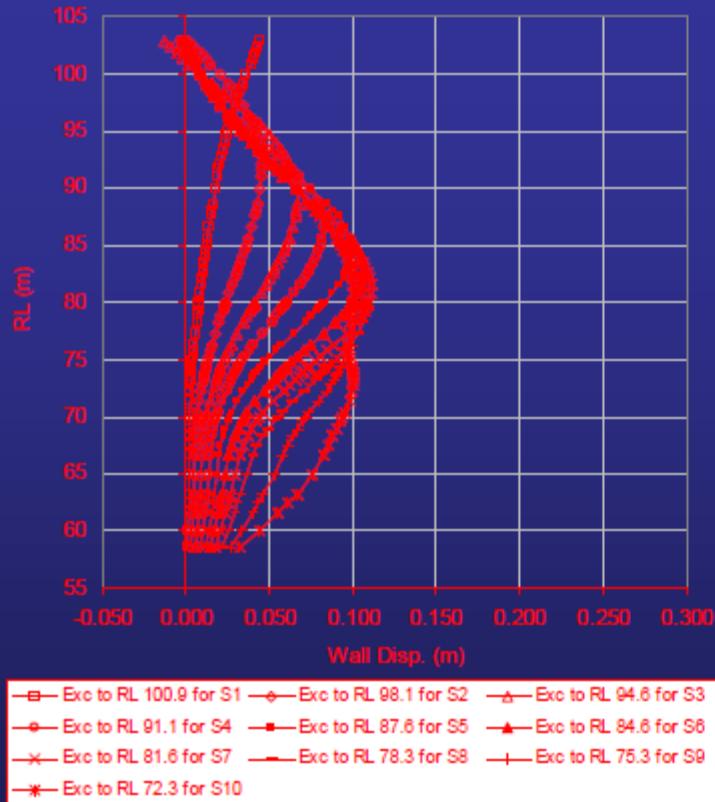
Undrained Analysis



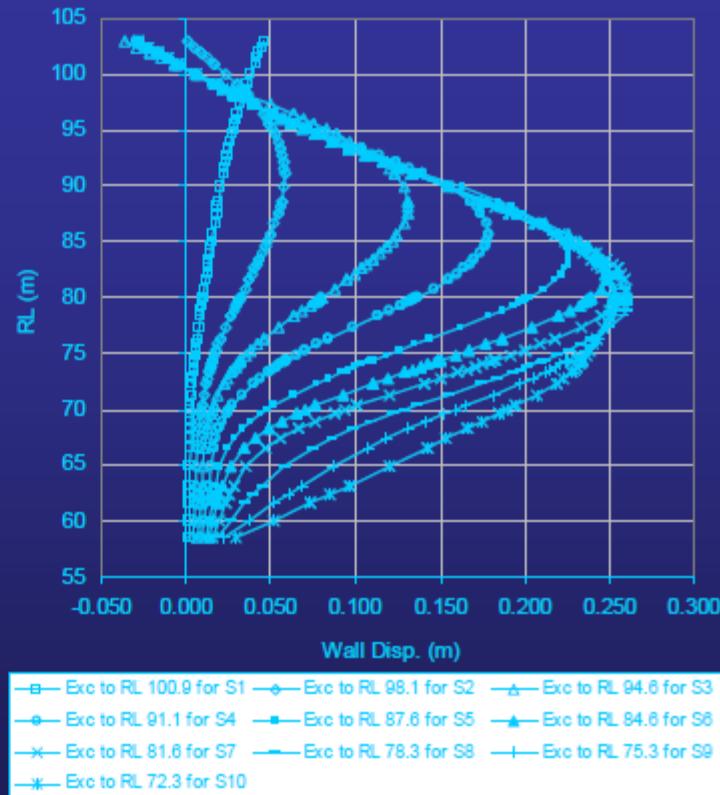




Effective Stress Parameters Method A



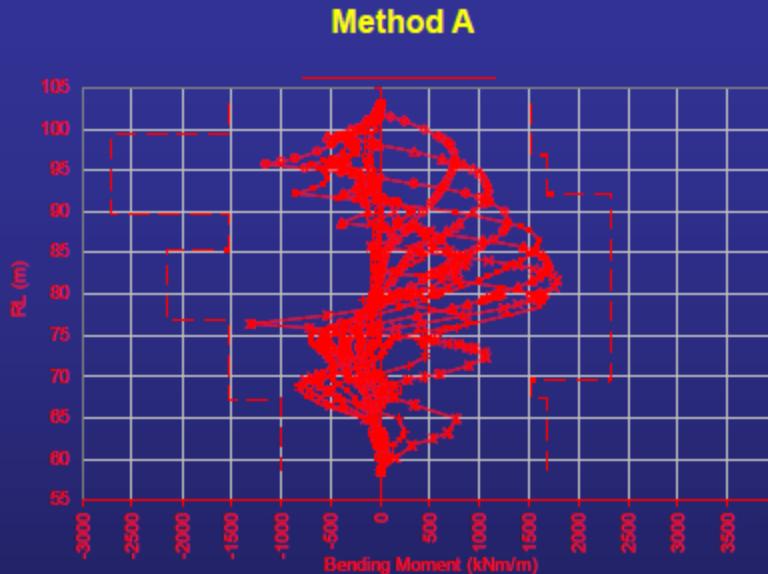
Undrained Strength Parameters Method B



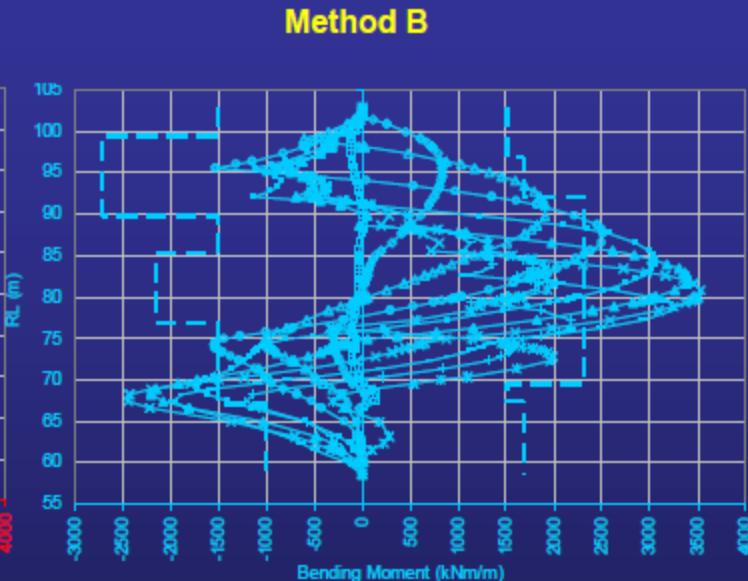
*M3 - South Wall Displacement
Method A versus Method B*



Effective Stress Parameters



Undrained Strength Parameters



*M3 - South Wall bending moments
Method A versus Method B*

Reasons

- Method A over-estimates the undrained shear strength of normally and lightly overconsolidated clays
- Its use led to a 50% under-estimate of wall displacements and of bending moments and an under-estimate of the 9th level strut force of 10%