Experience from the performance of ground improvement in thick marine clay deposit

by

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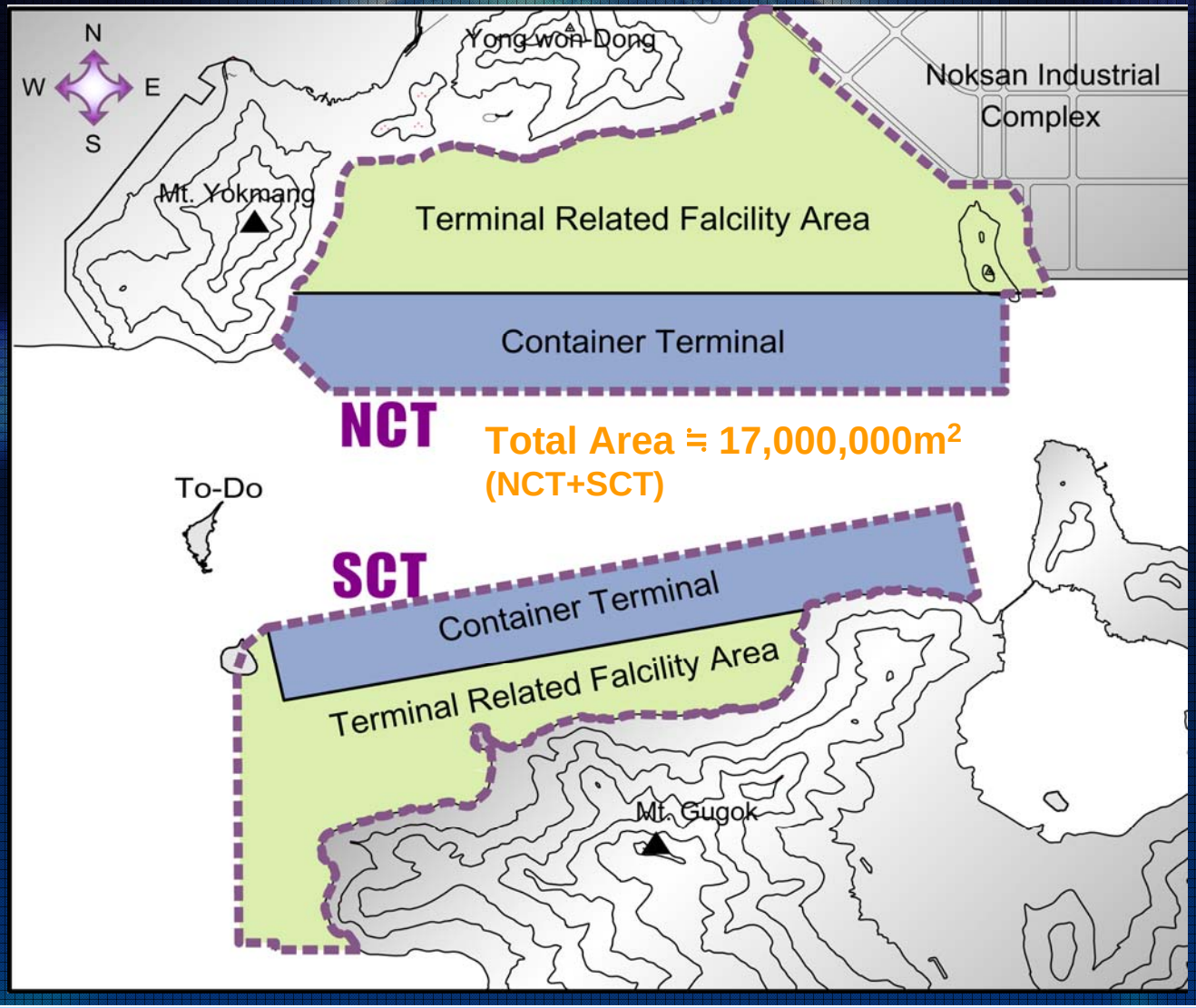
Contents

Location of the Busan New Port

Photograph of BNP site (from the satellite work)

Terminal and their related facility areas of BNP

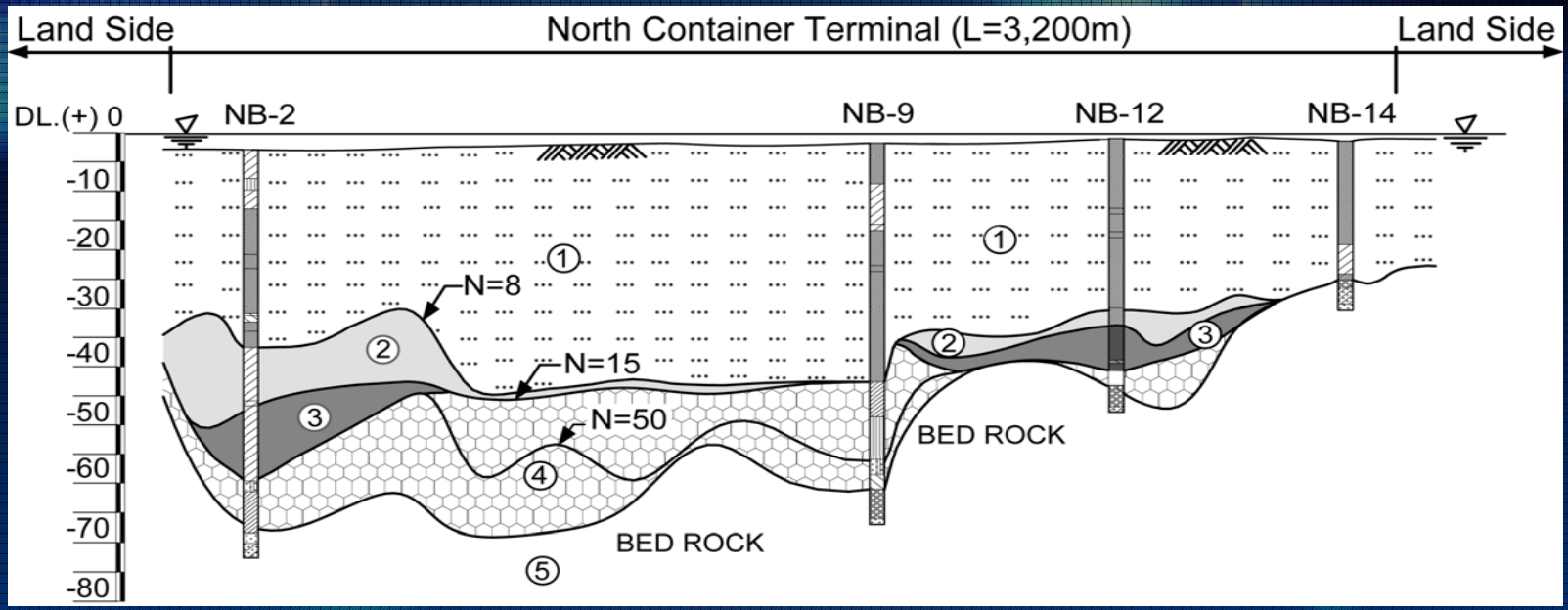


Contents

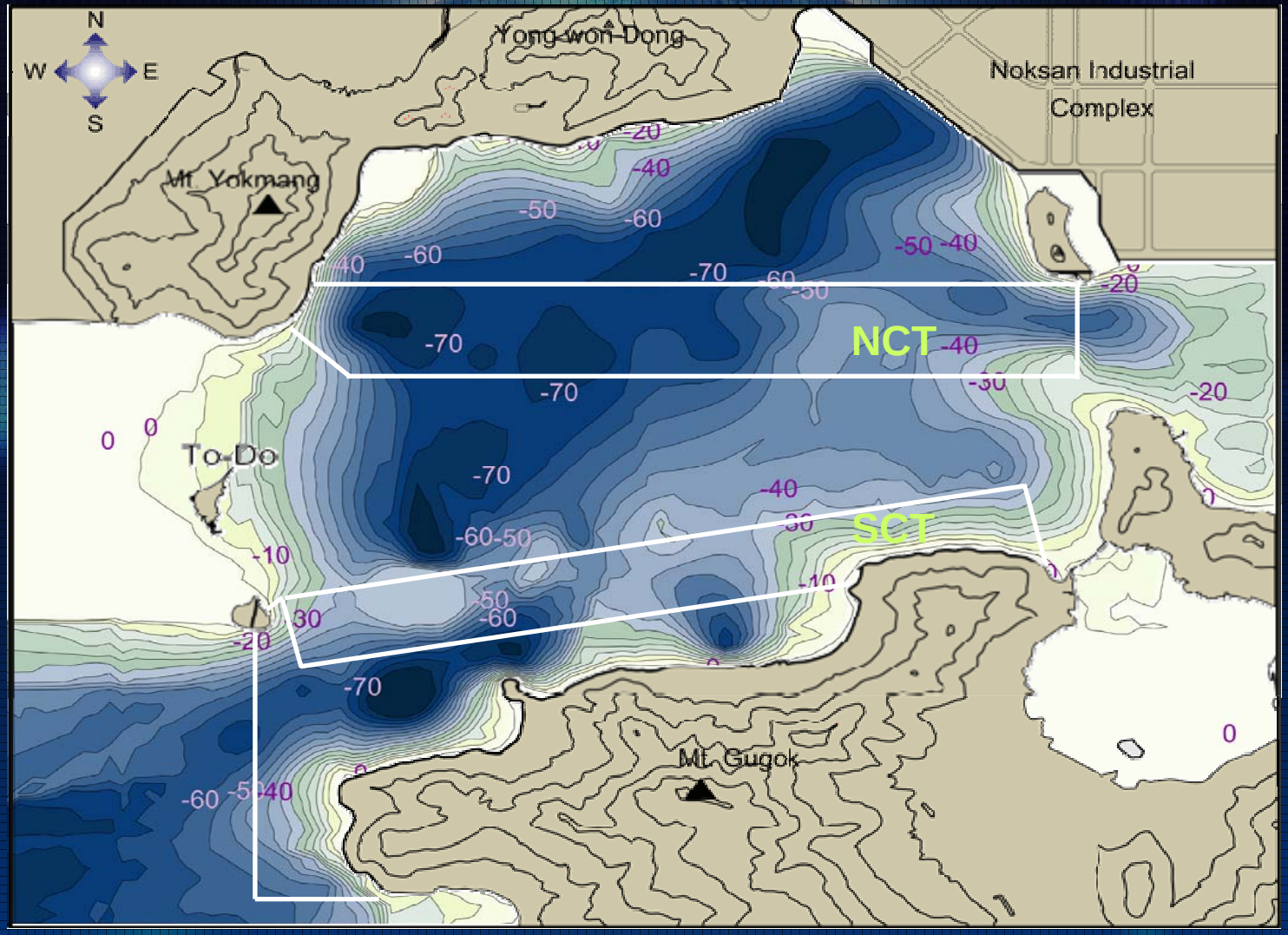
Field and laboratory tests

Field Test	Quantity
Exploratory boring	257
CPT(piezocone)	84
Vane shear	108
Pressuremeter	18

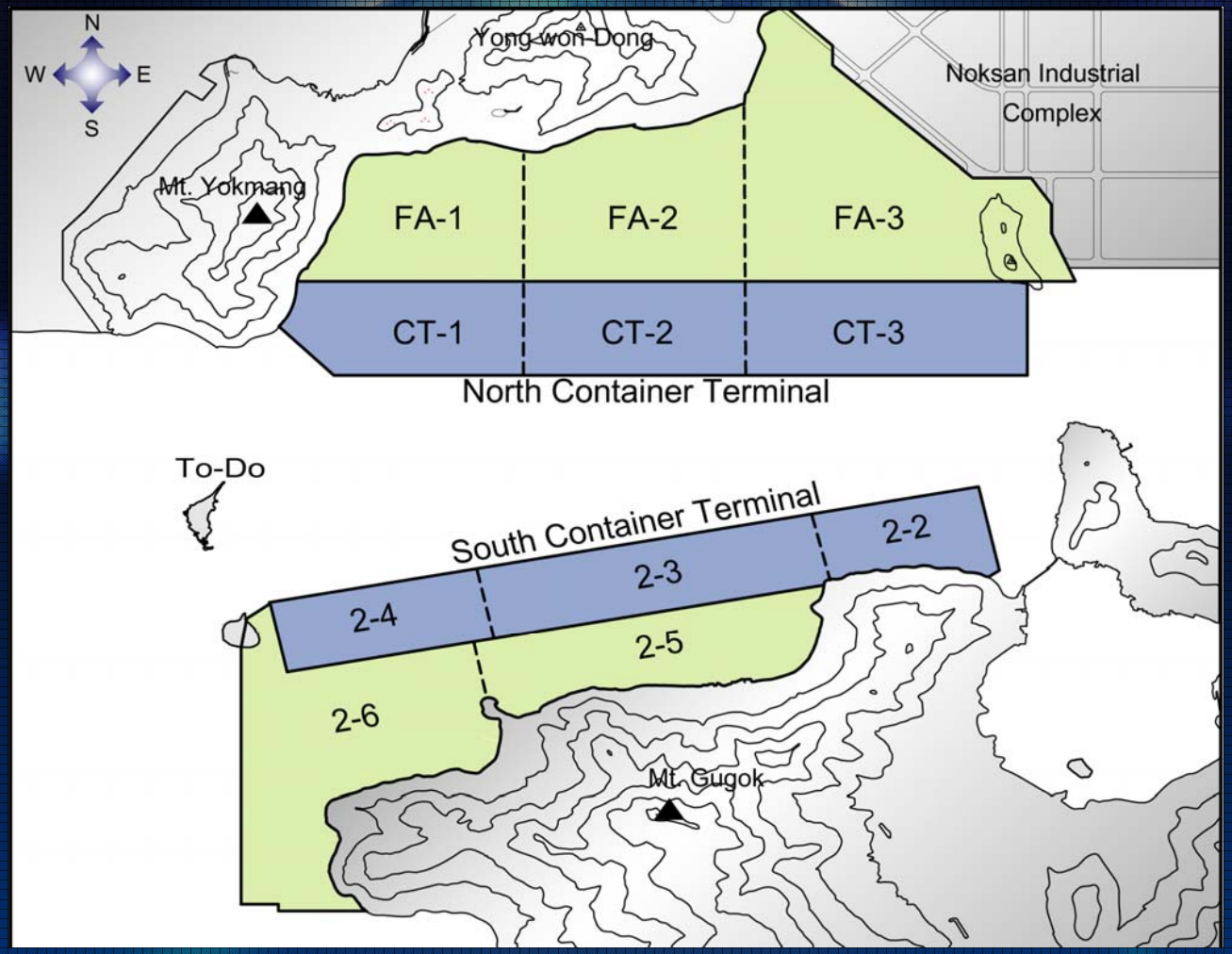
Laboratory Test	Quantity
Natural moisture content	969
Sieve analysis	969
Atterberg limit	828
Consolidation	566
Unconfined compression	503
Triaxial compression	610



Deepest contours of clay layer (N<8) Bedrock contours

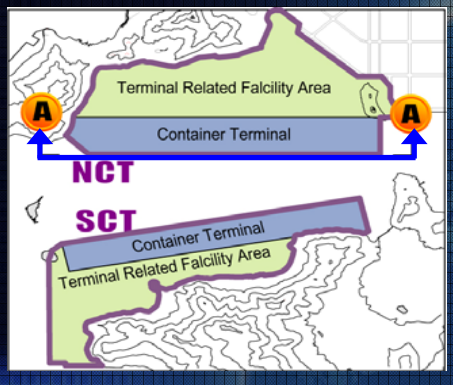


Horizontal zoning Based on subsoil conditions



Container Terminal Area Terminal Related Facility Area

Profile of subsoil (section A-A)



Legend

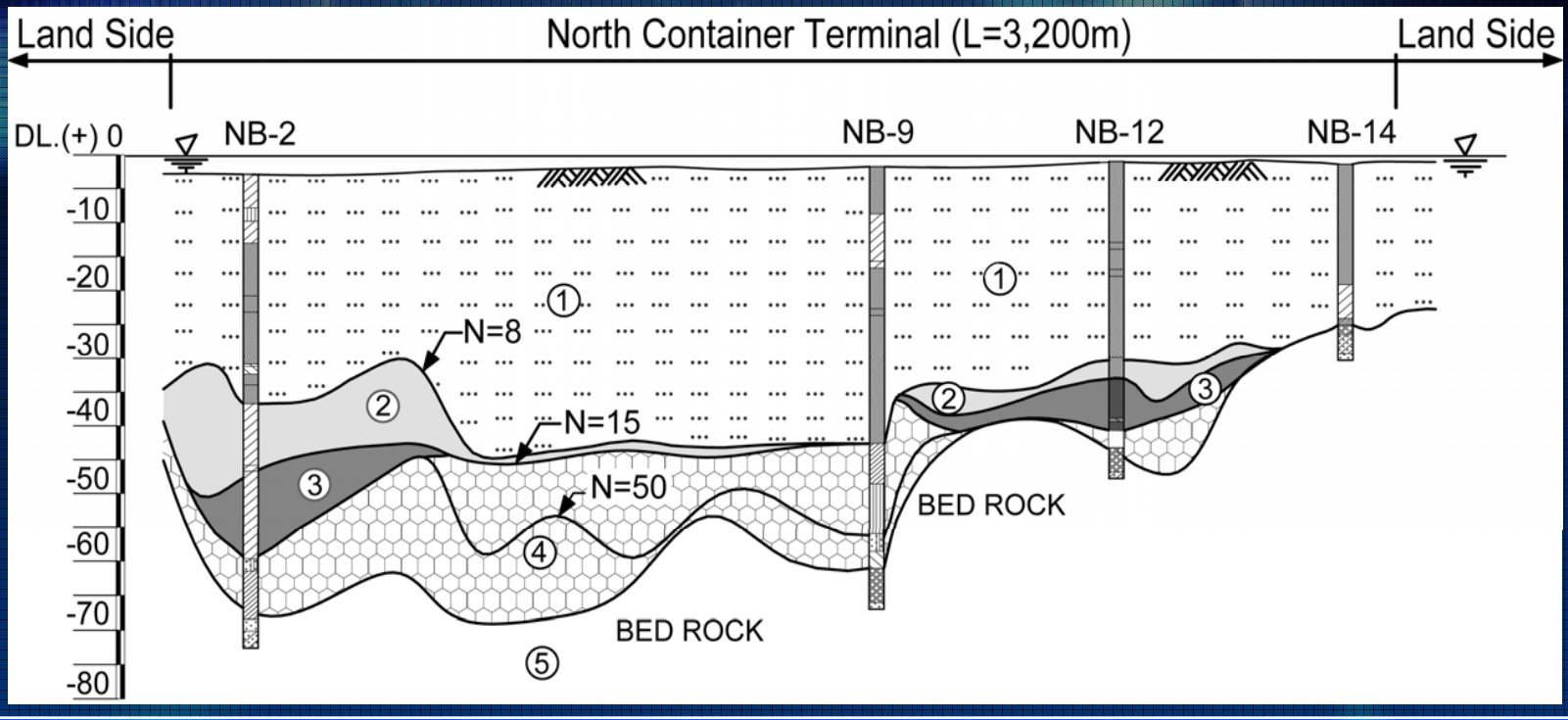
① : Clay (N<8)

② : Clay (8<N<15)

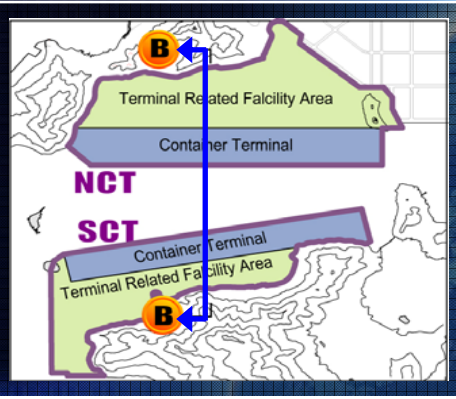
③ : Clay (15<N)

④ : Sand & Gravel

⑤ : Bed Rock



Profile of subsoil (section B-B)



Legend

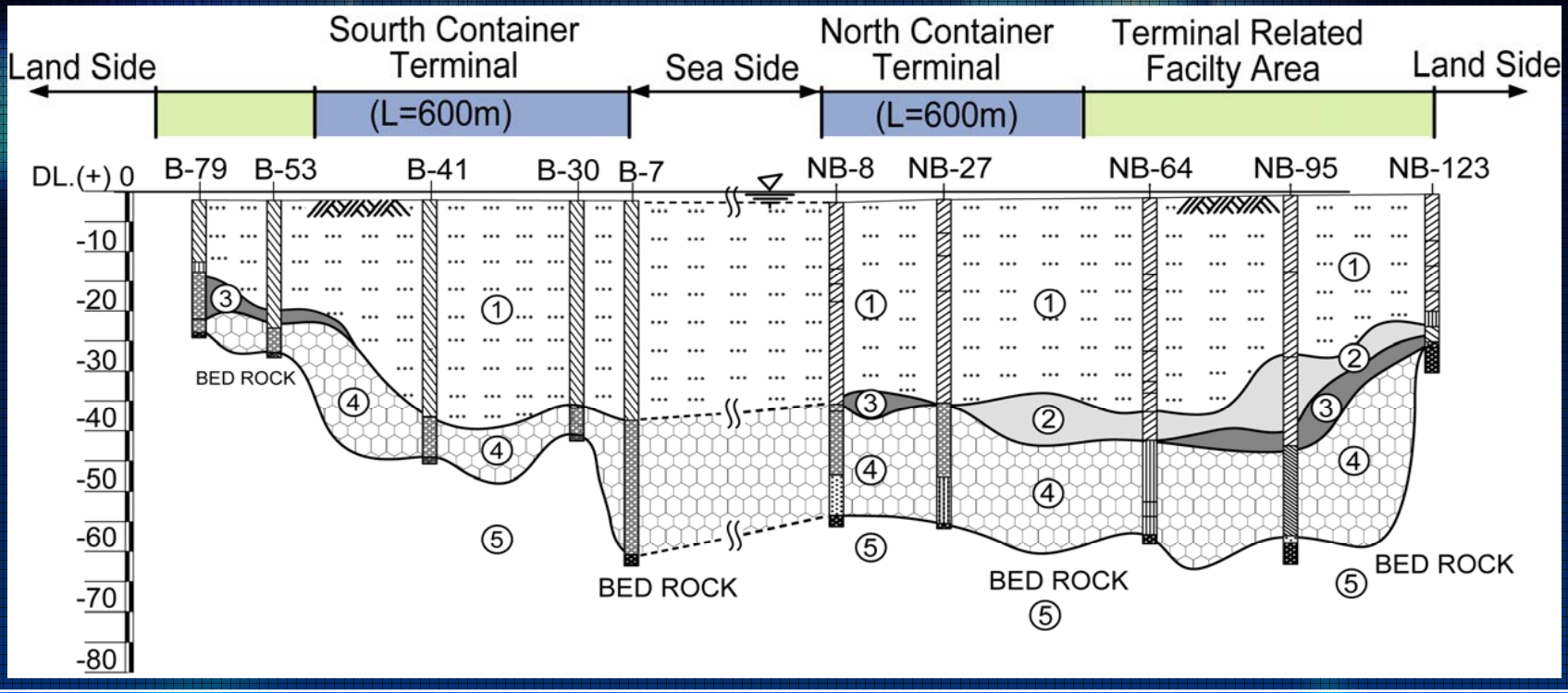
① : Clay (N<8)

② : Clay (8<N<15)

③ : Clay (15<N)

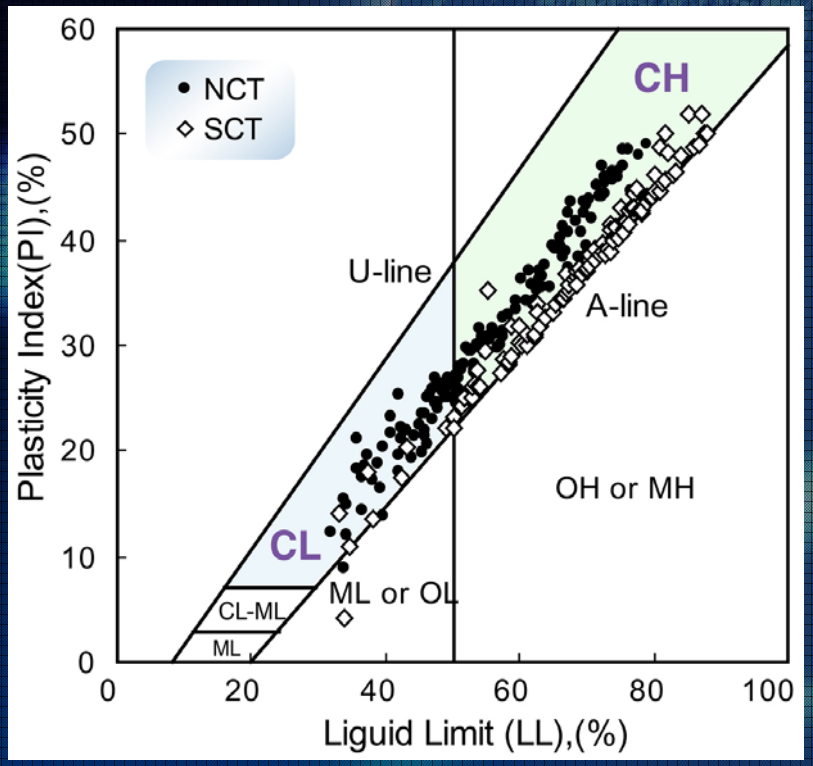
④ : Sand & Gravel

⑤ : Bed Rock

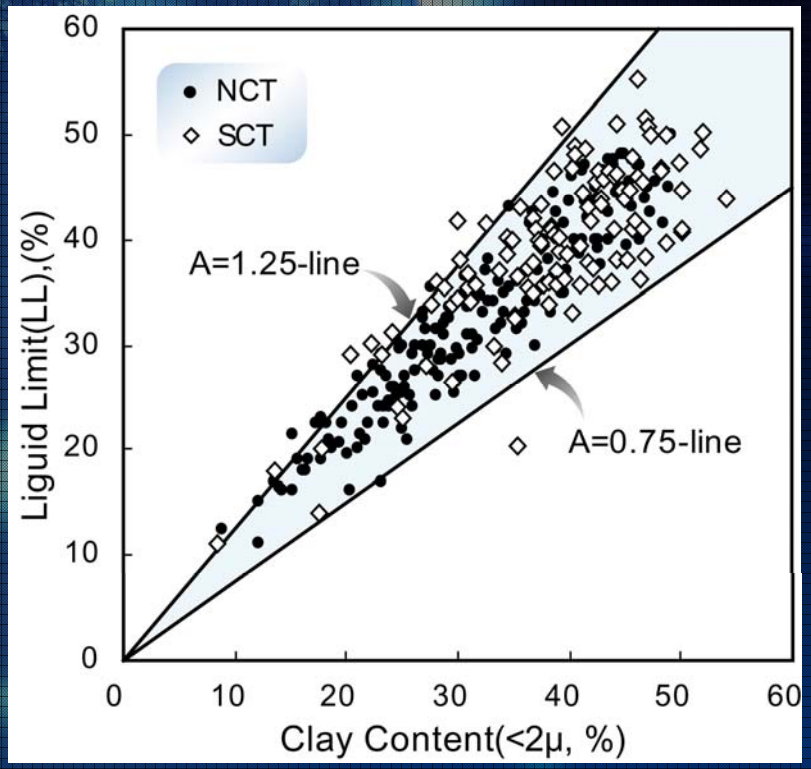


Plasticity chart & activity

Plasticity chart

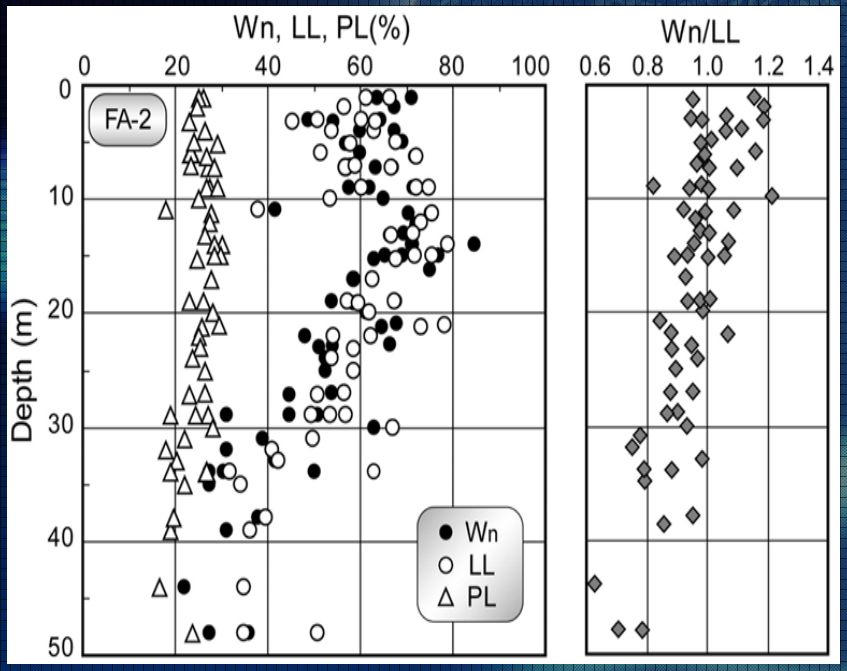


Activity

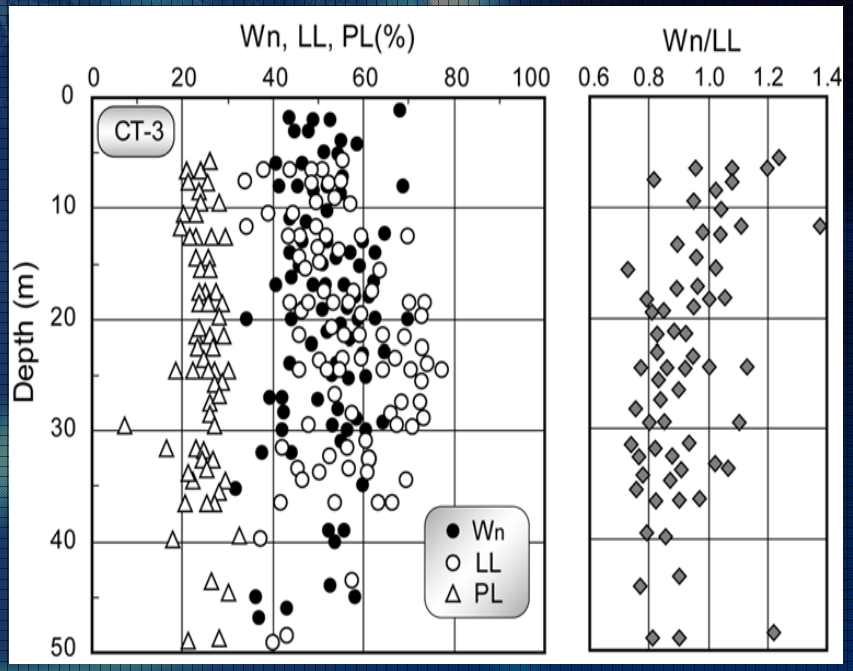


Atterberg limits with depth

FA-2

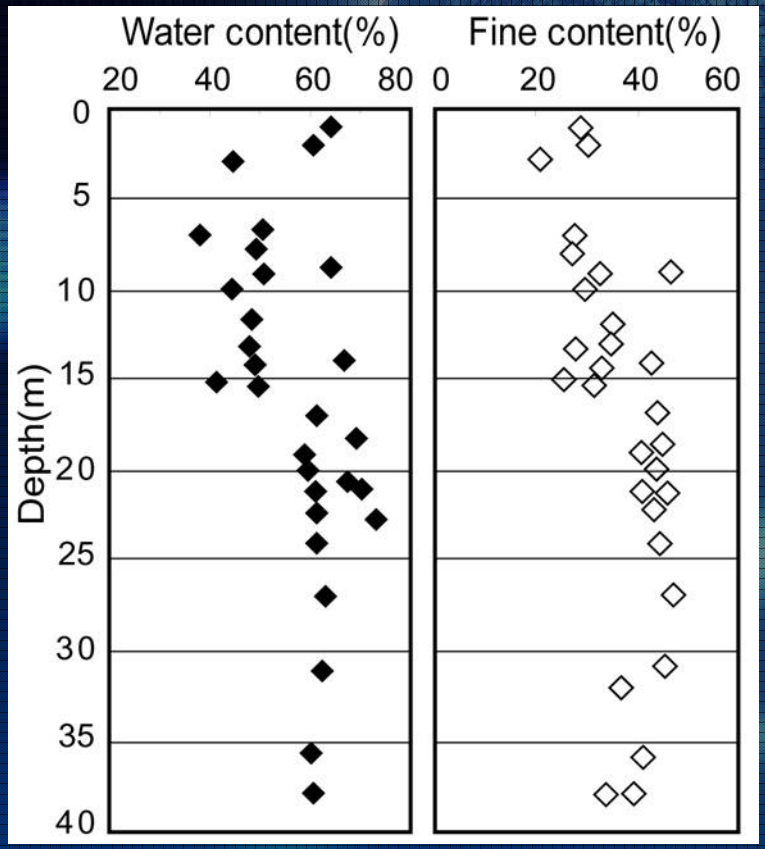


CT-3

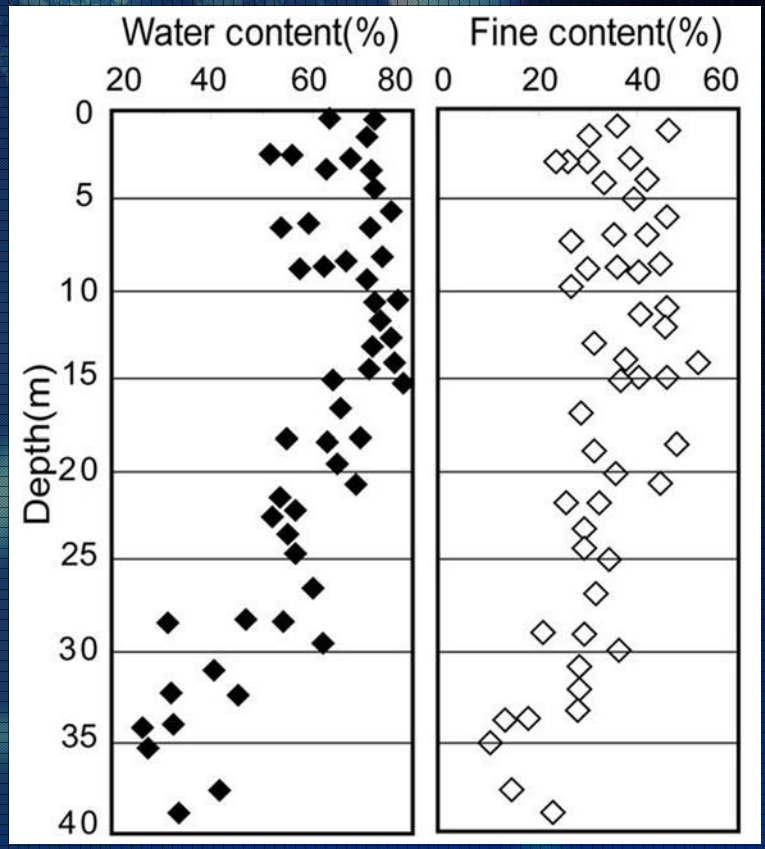


Variation in water content and fine content

CT-2

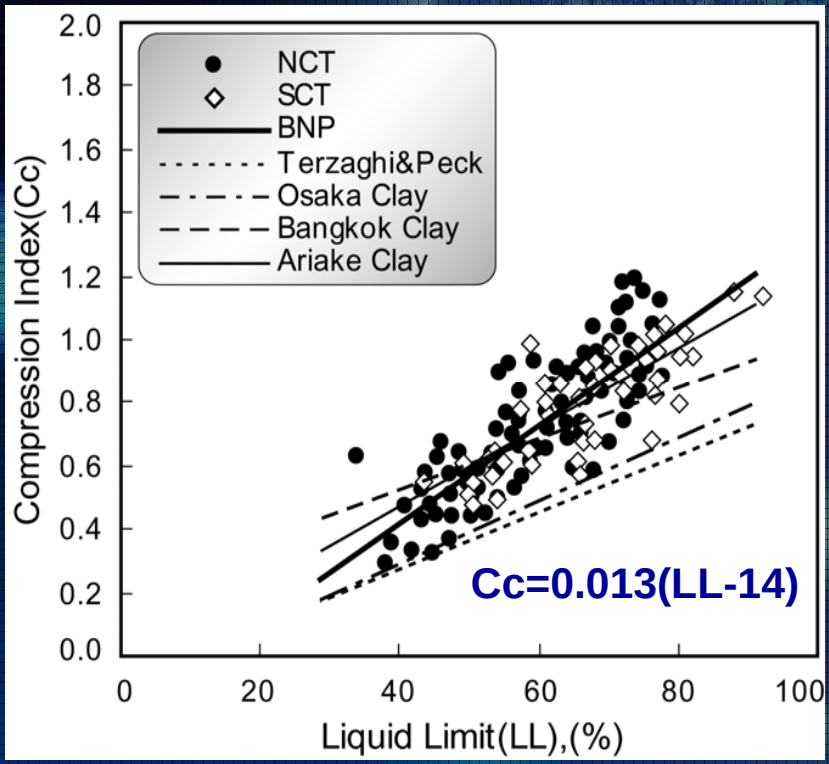


FA-1

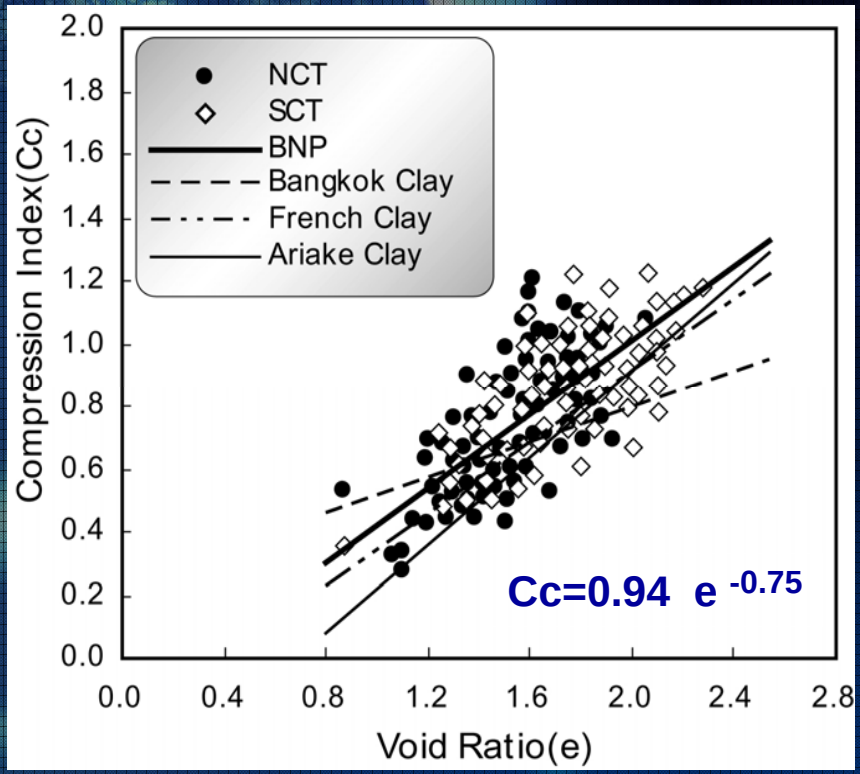


Compression Indices with LL and e

Cc - LL



Cc - e

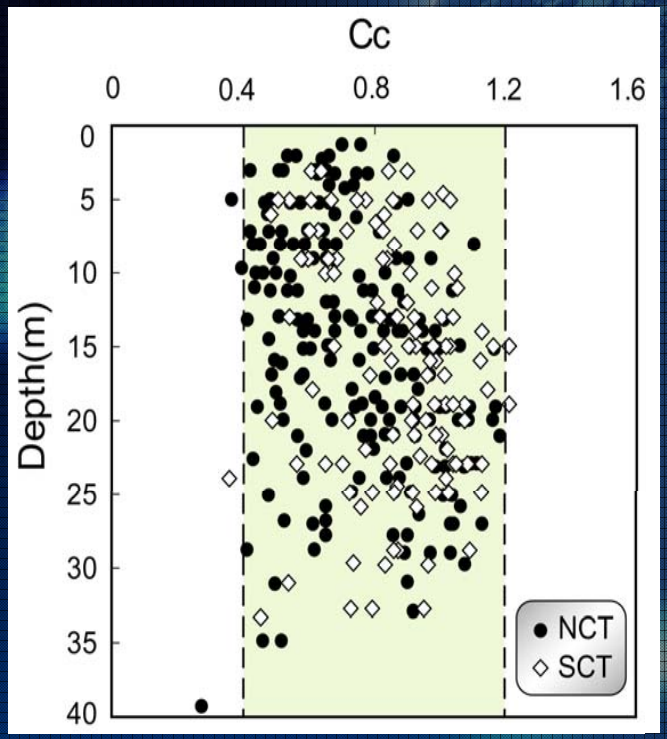


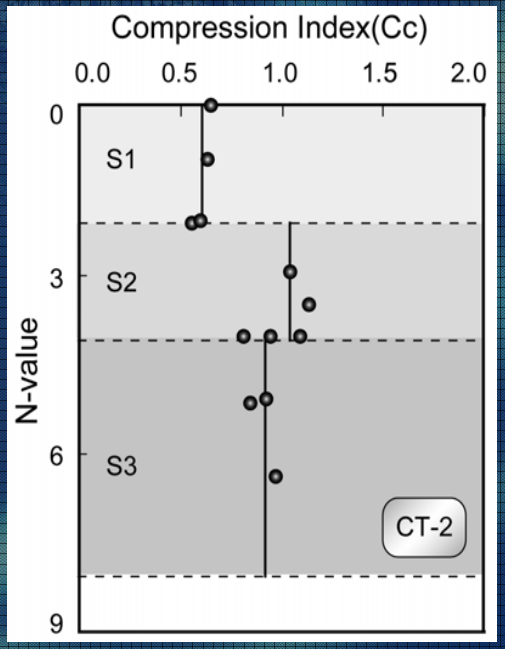
C_c values obtained from NCT & SCT sites

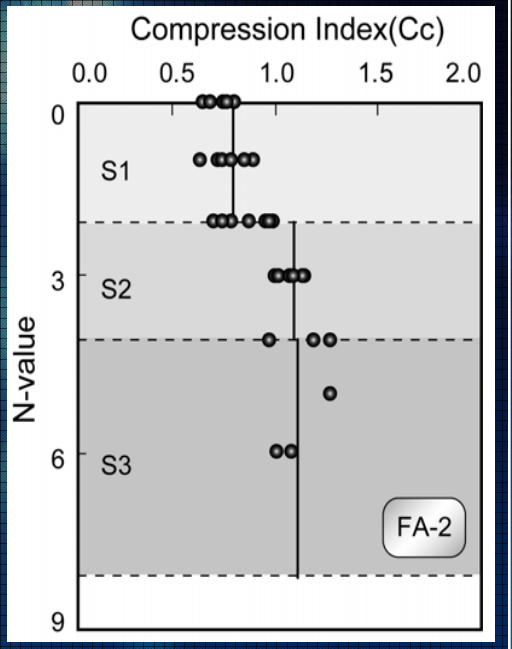
NCT+SCT

CT-2

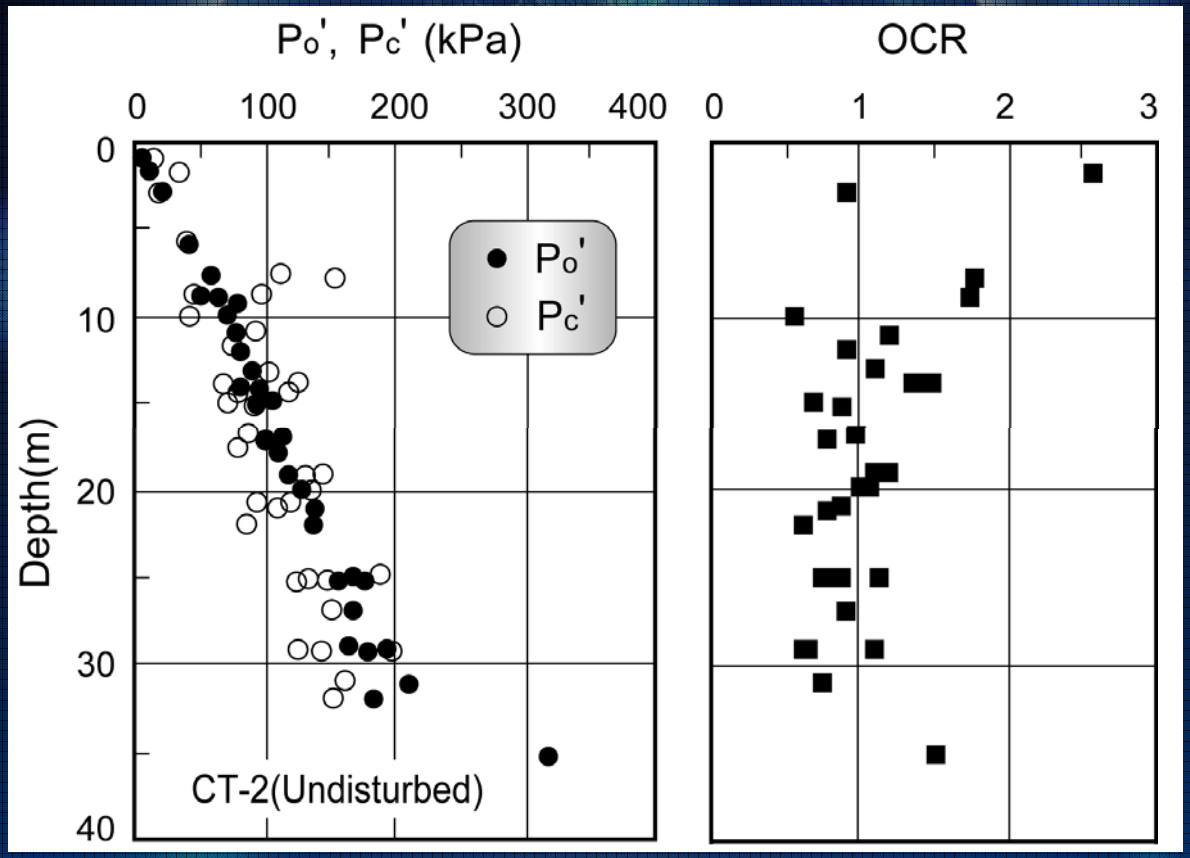
FA-2



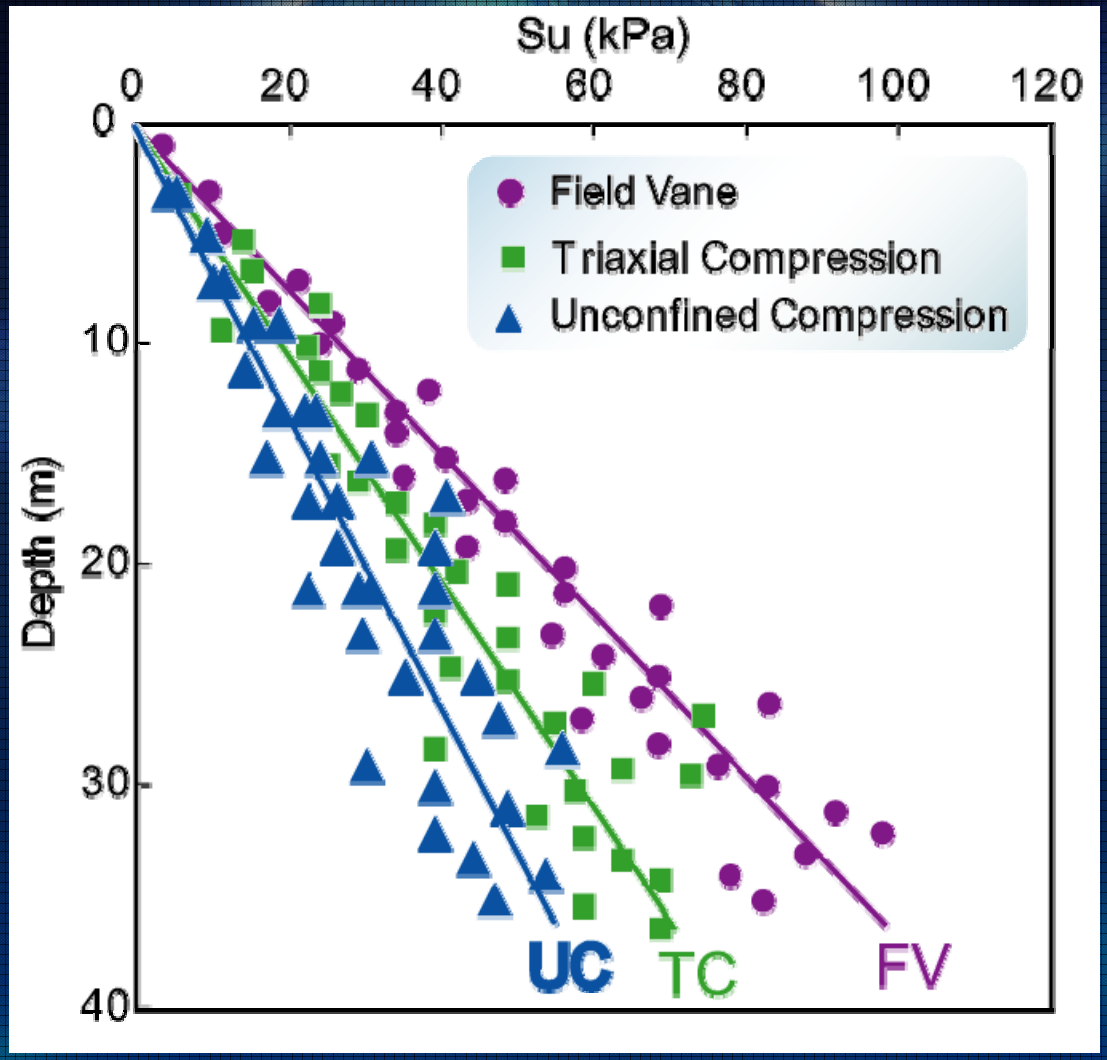




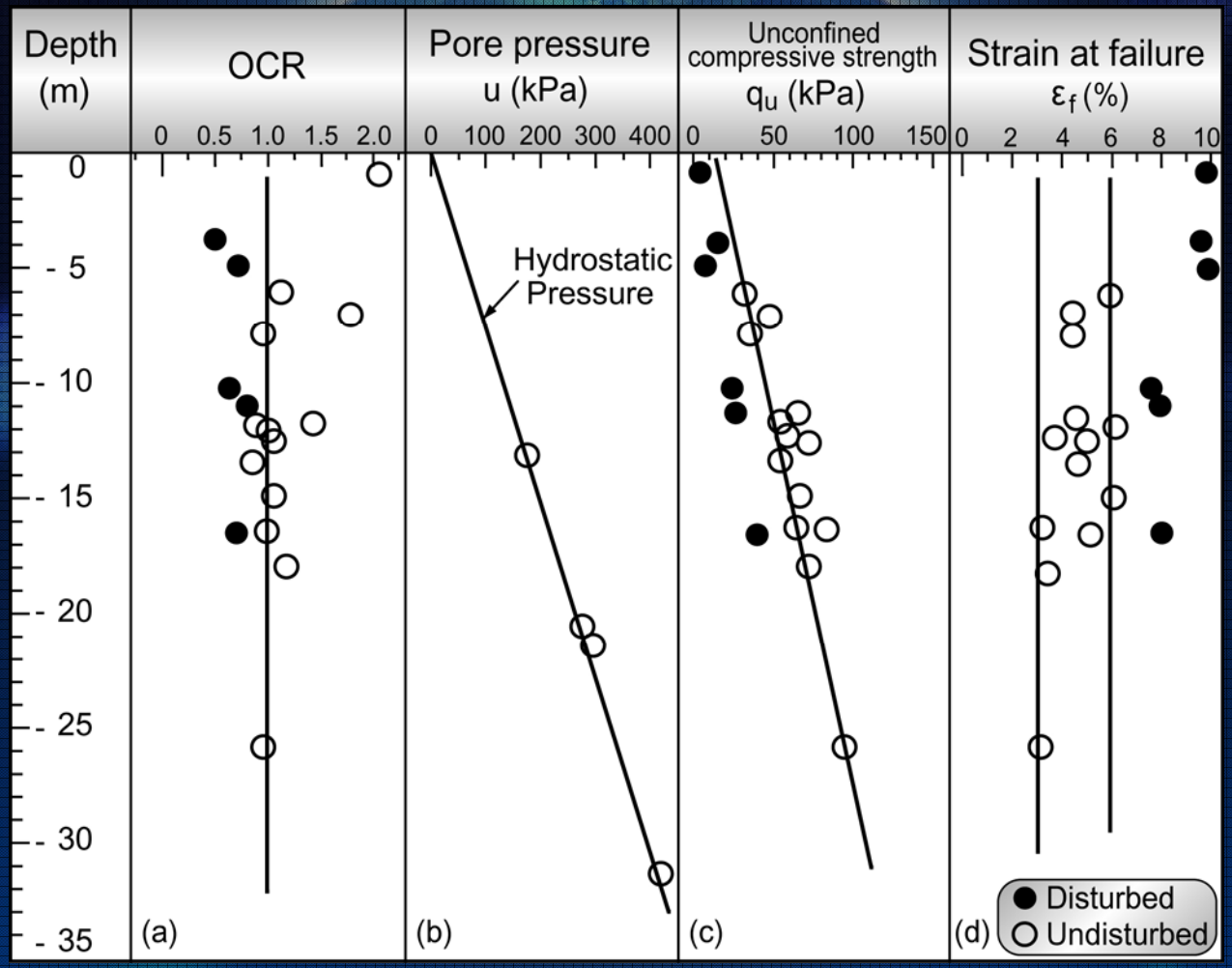
P_o', P_c' and OCR values with depth



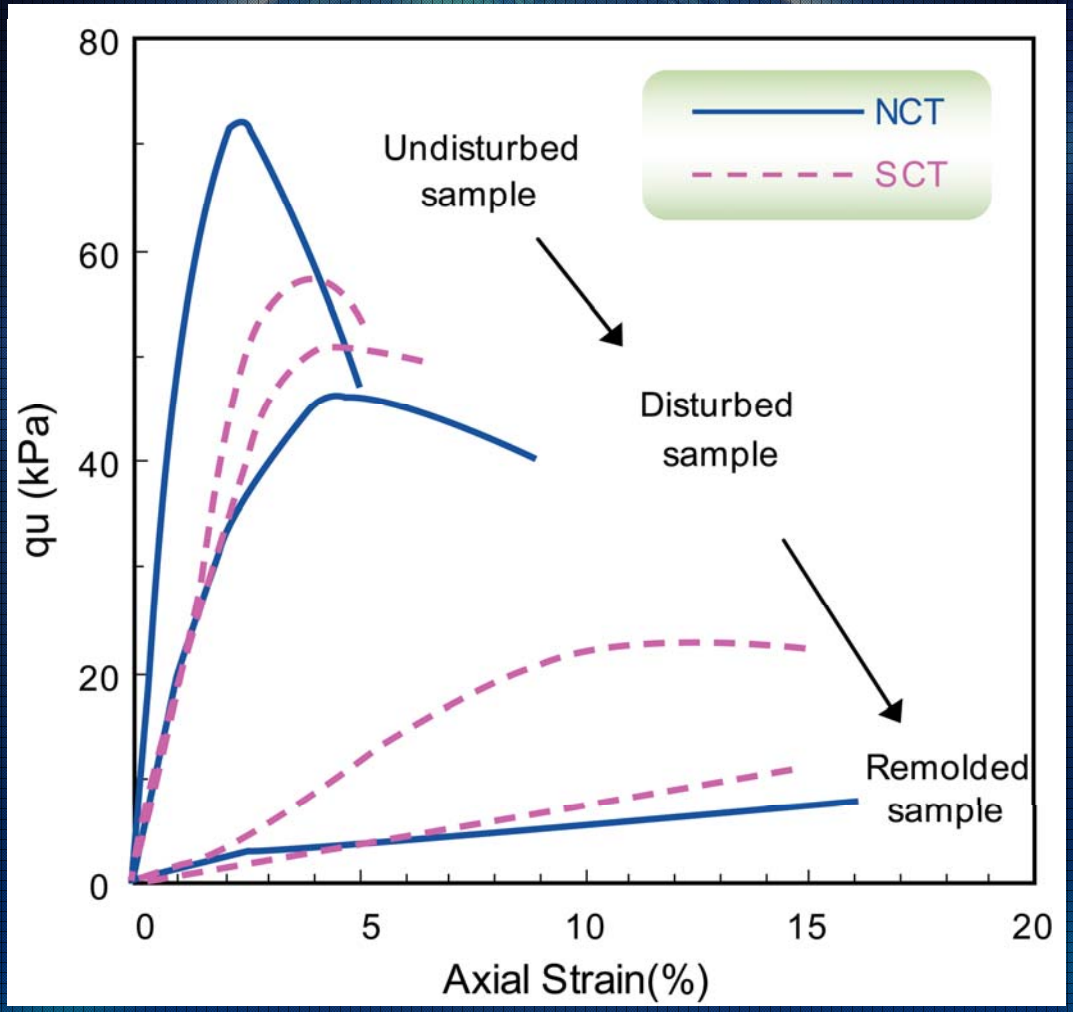
Su obtained from different test devices



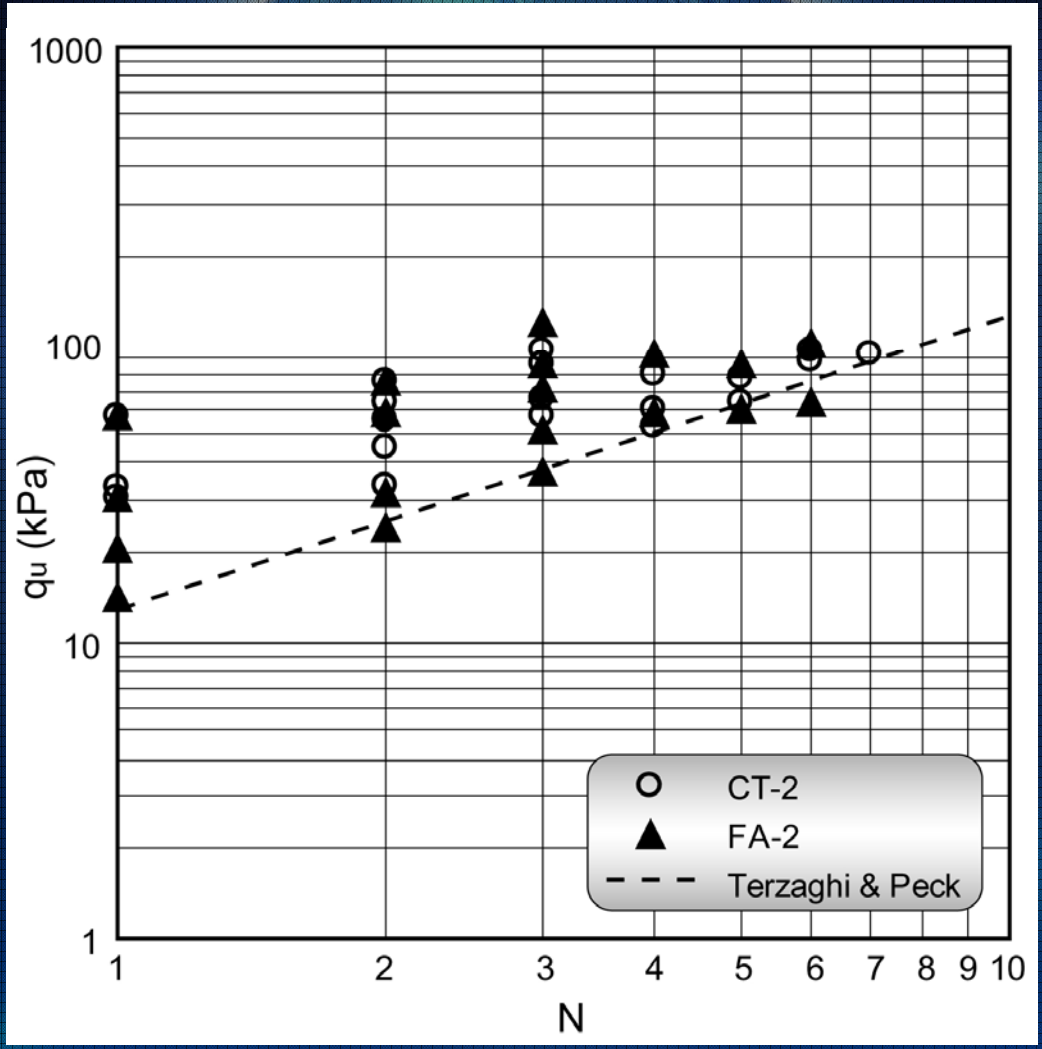
Variation of OCR, u, q_u and ε_f



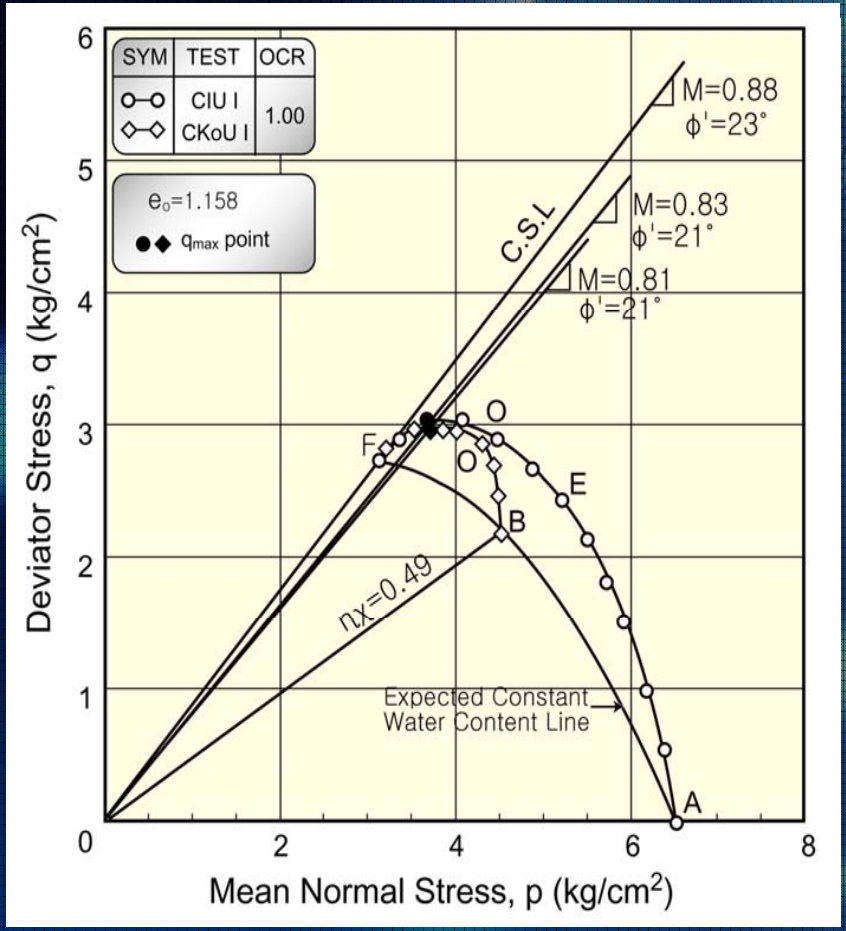
q_u and axial strain in NCT & SCT regions

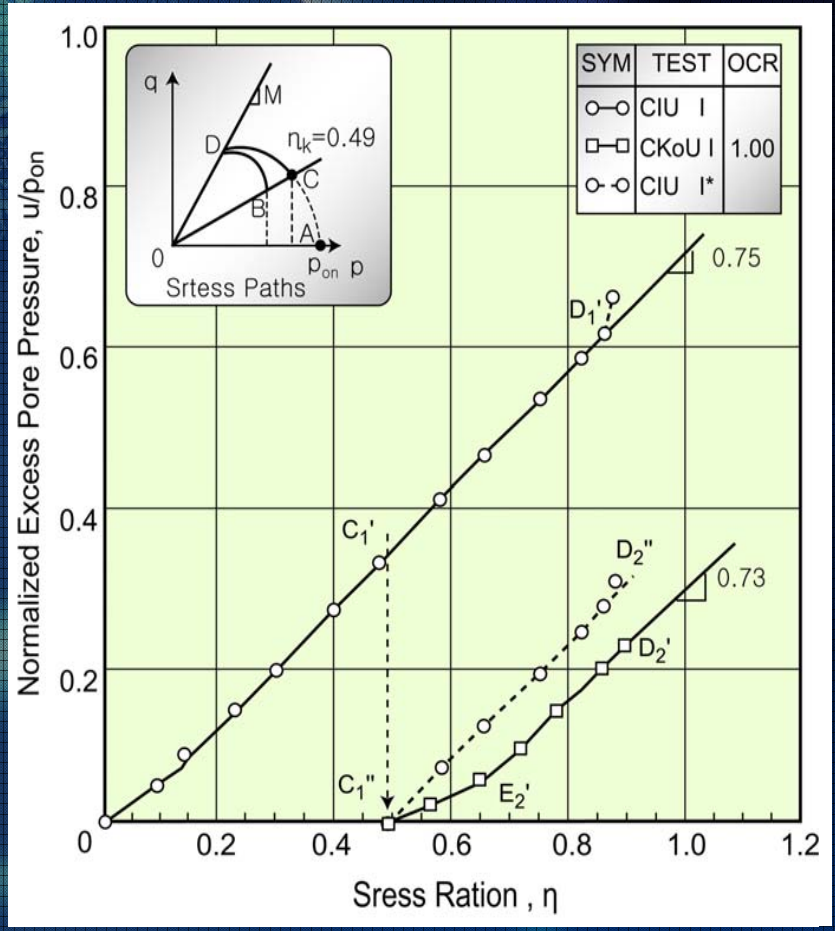


Relationship between qu and N values



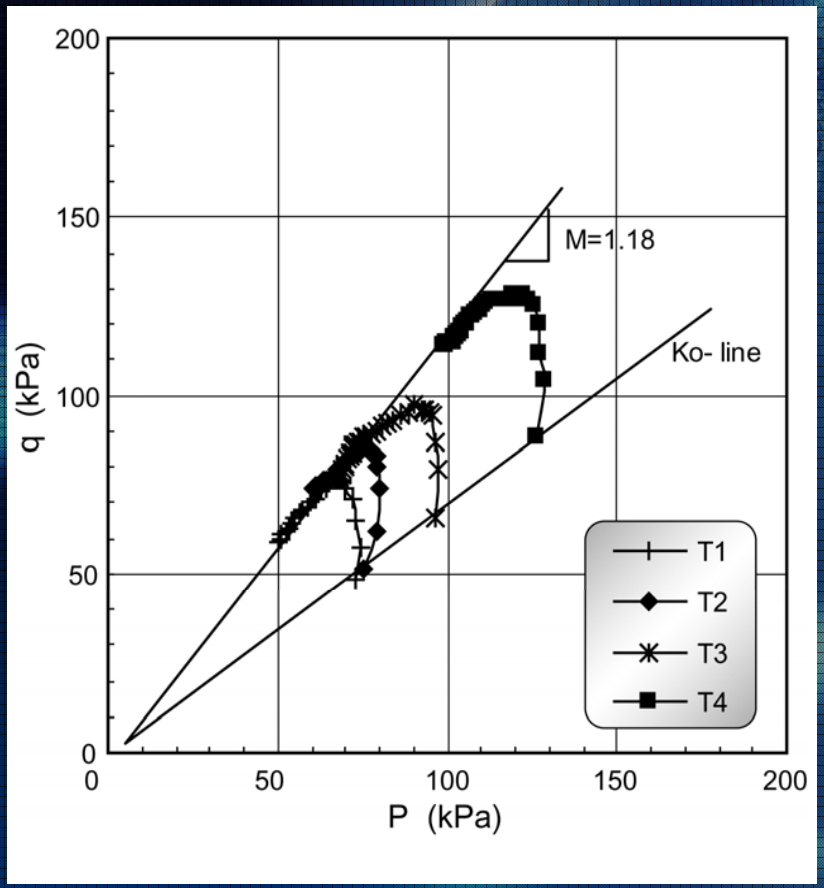
u/p_{on} vs. q/p relationship from N.C. Bangkok clay

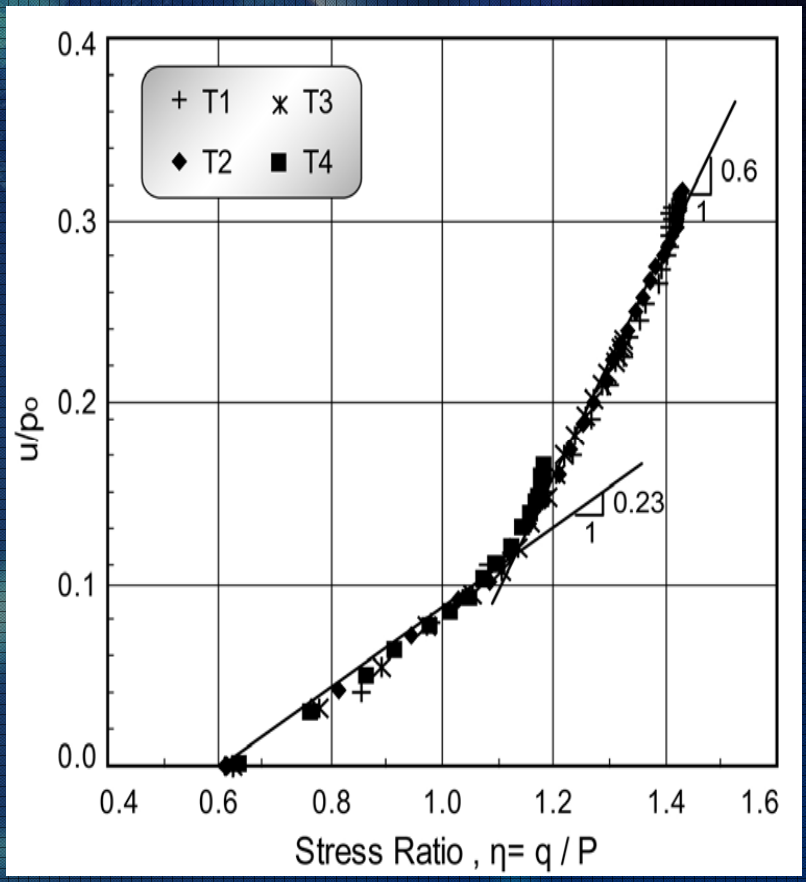




(Kim, S.R.,1991)

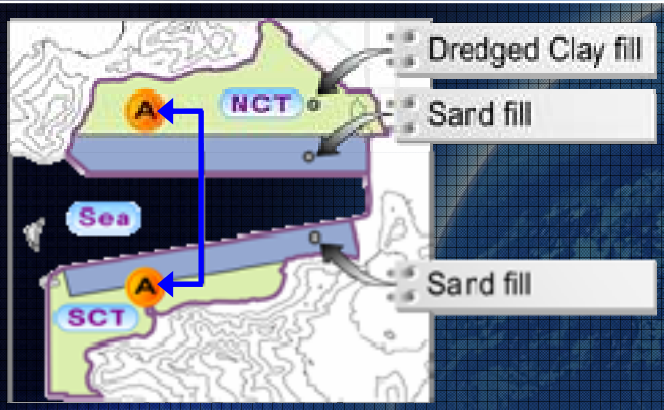
u/p_{on} vs. q/p relationship from CKoU tests

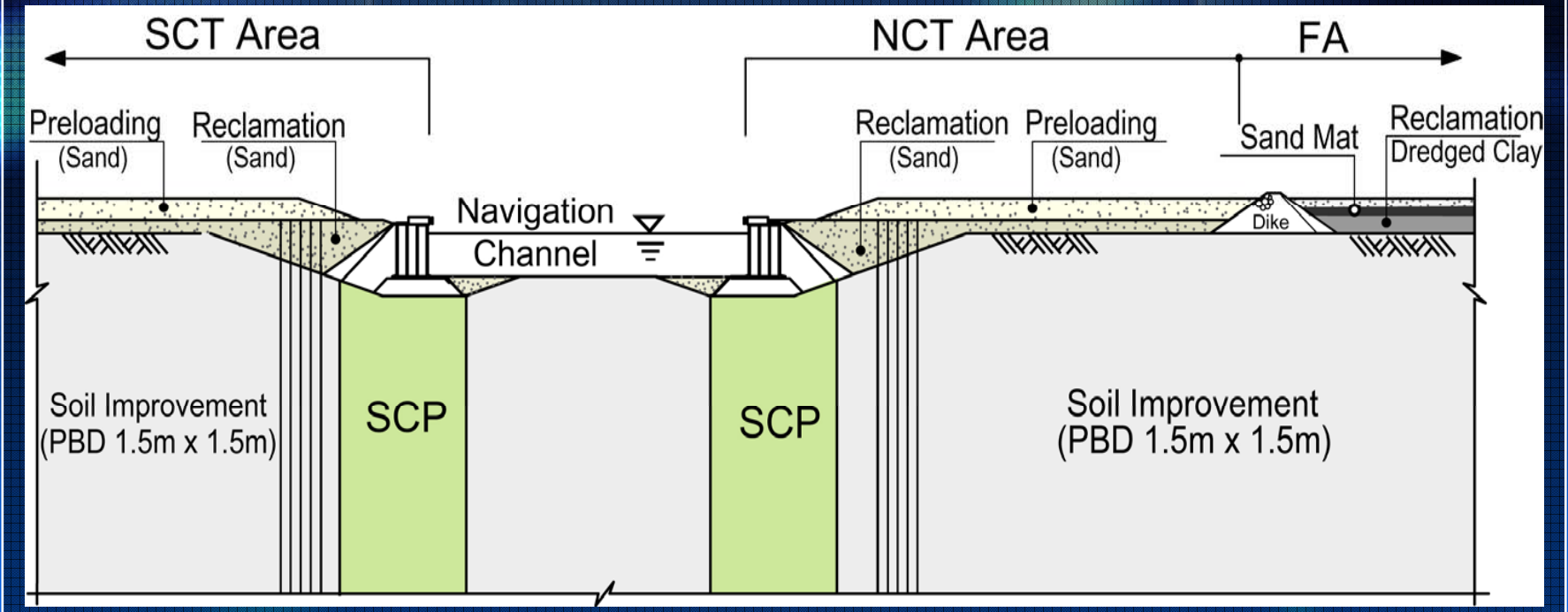




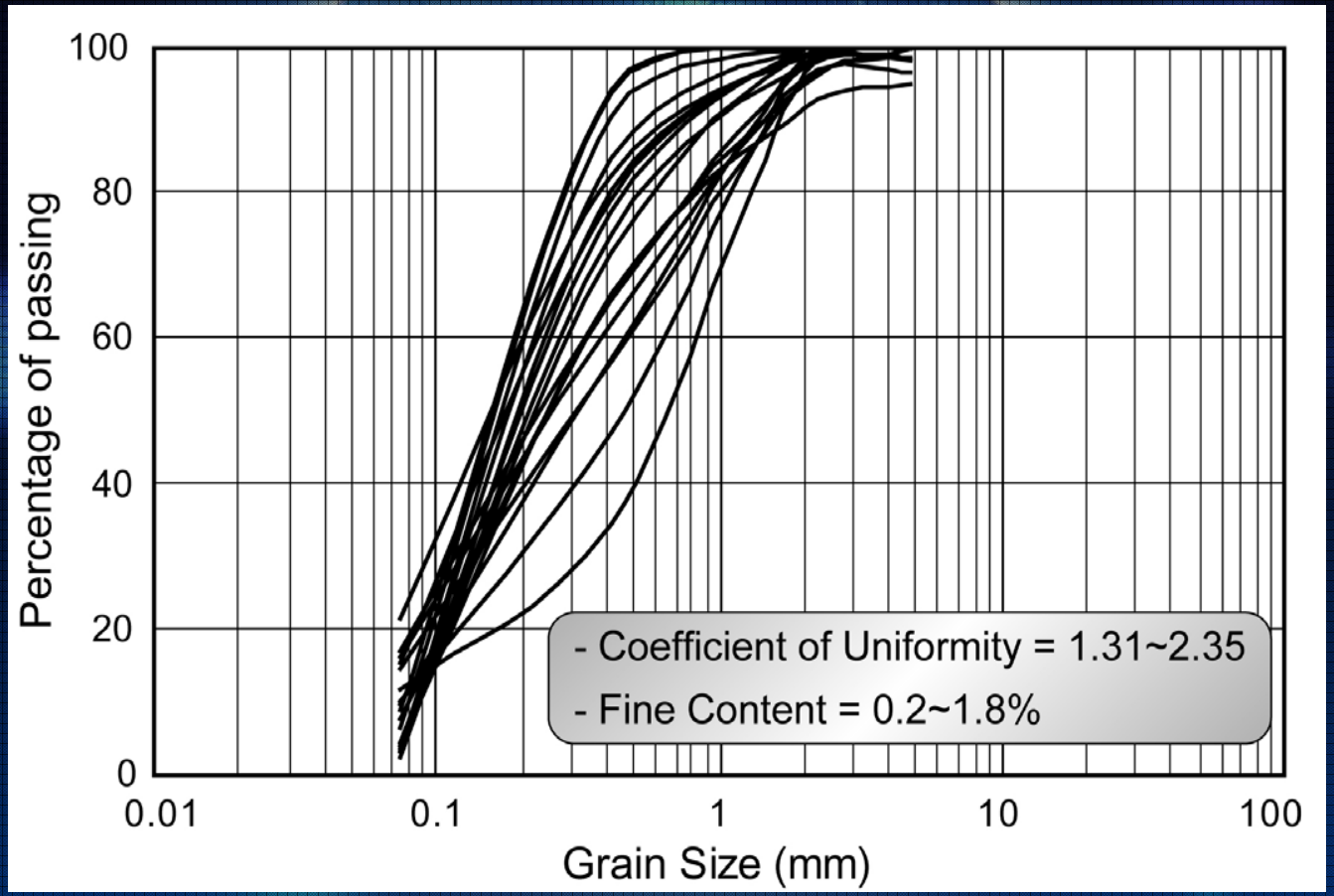
Contents

Typical section of BNP after reclamation

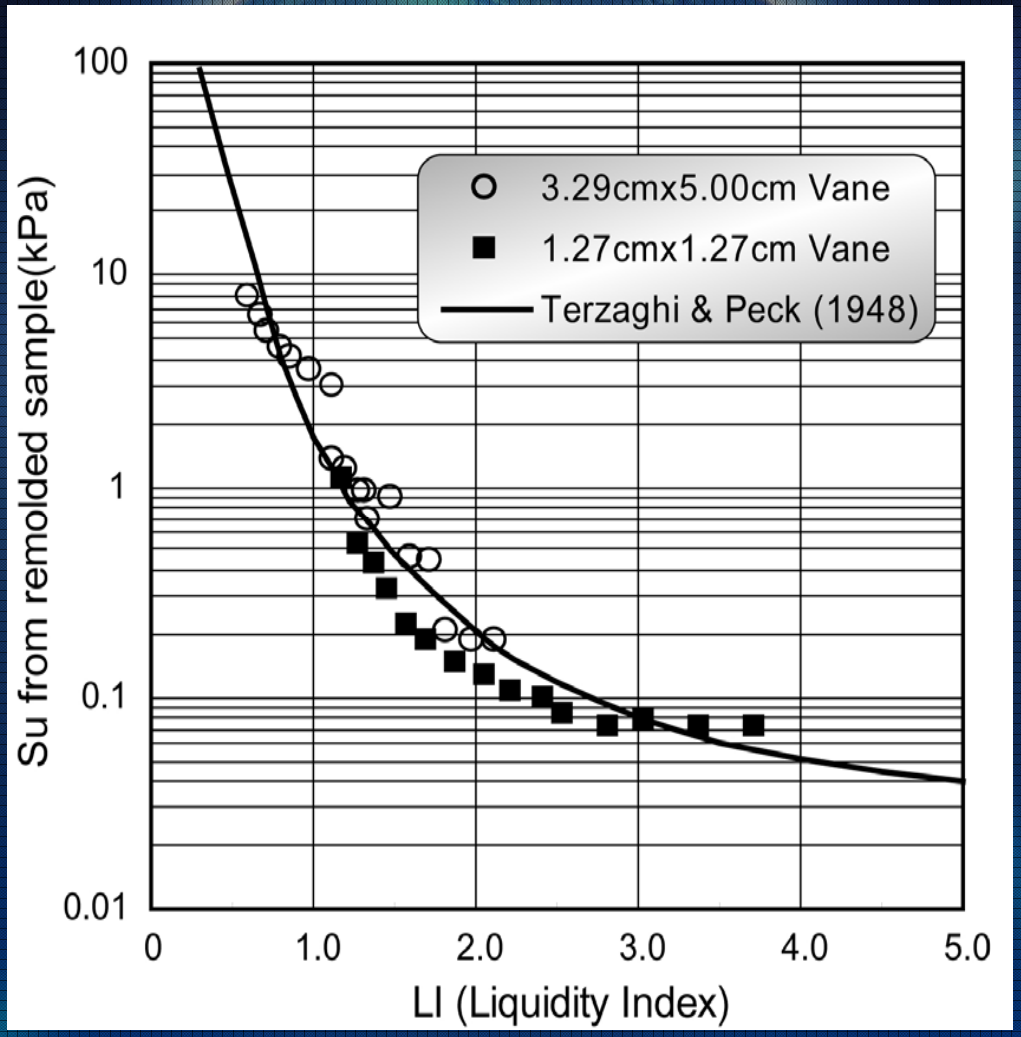




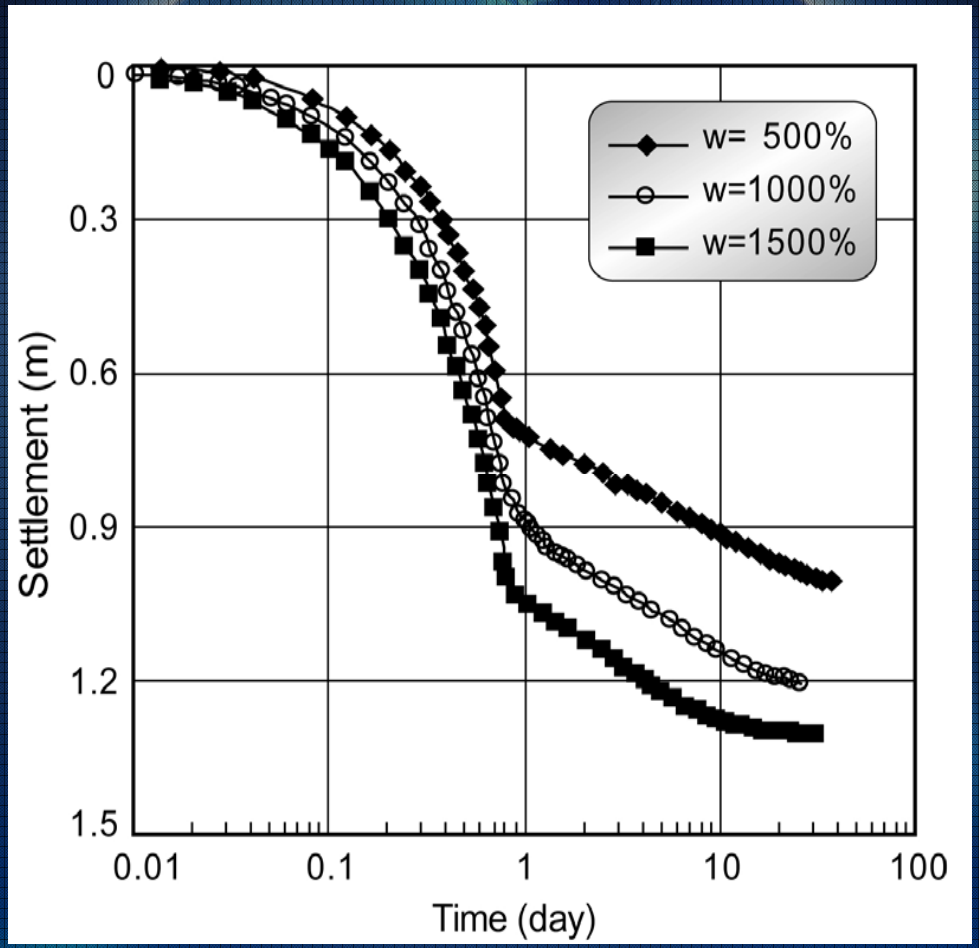
Grain size distribution of sand fill material



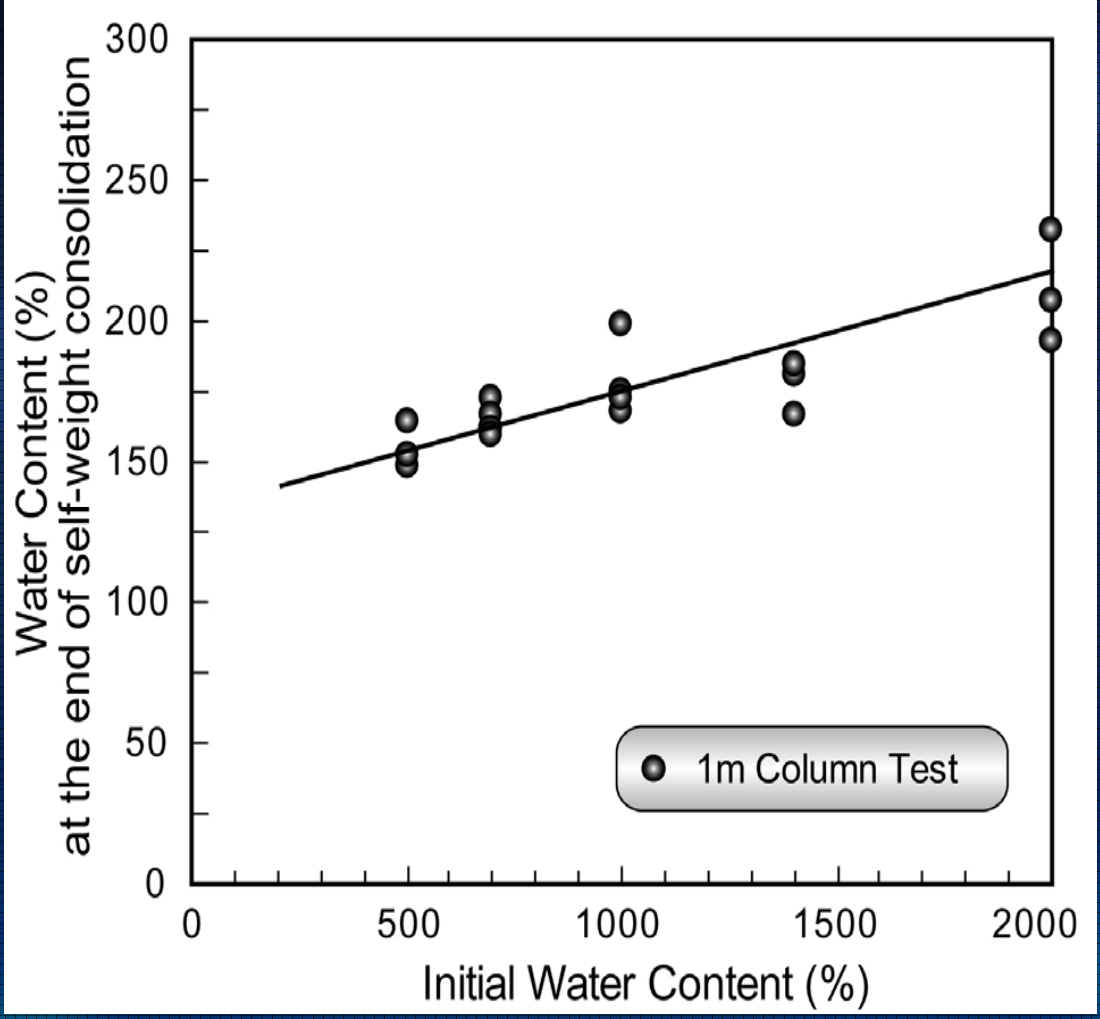
Su of remolded clay with liquidity index



Settlement curves of clay particles with time

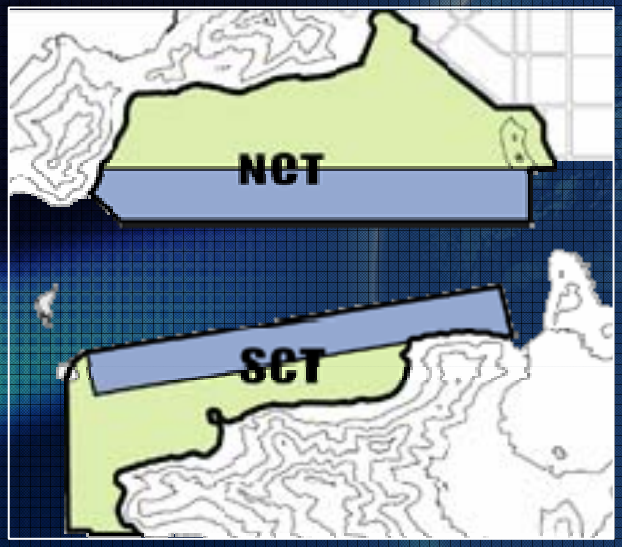


Effect of initial water content



Contents

Design loads and allowable settlements

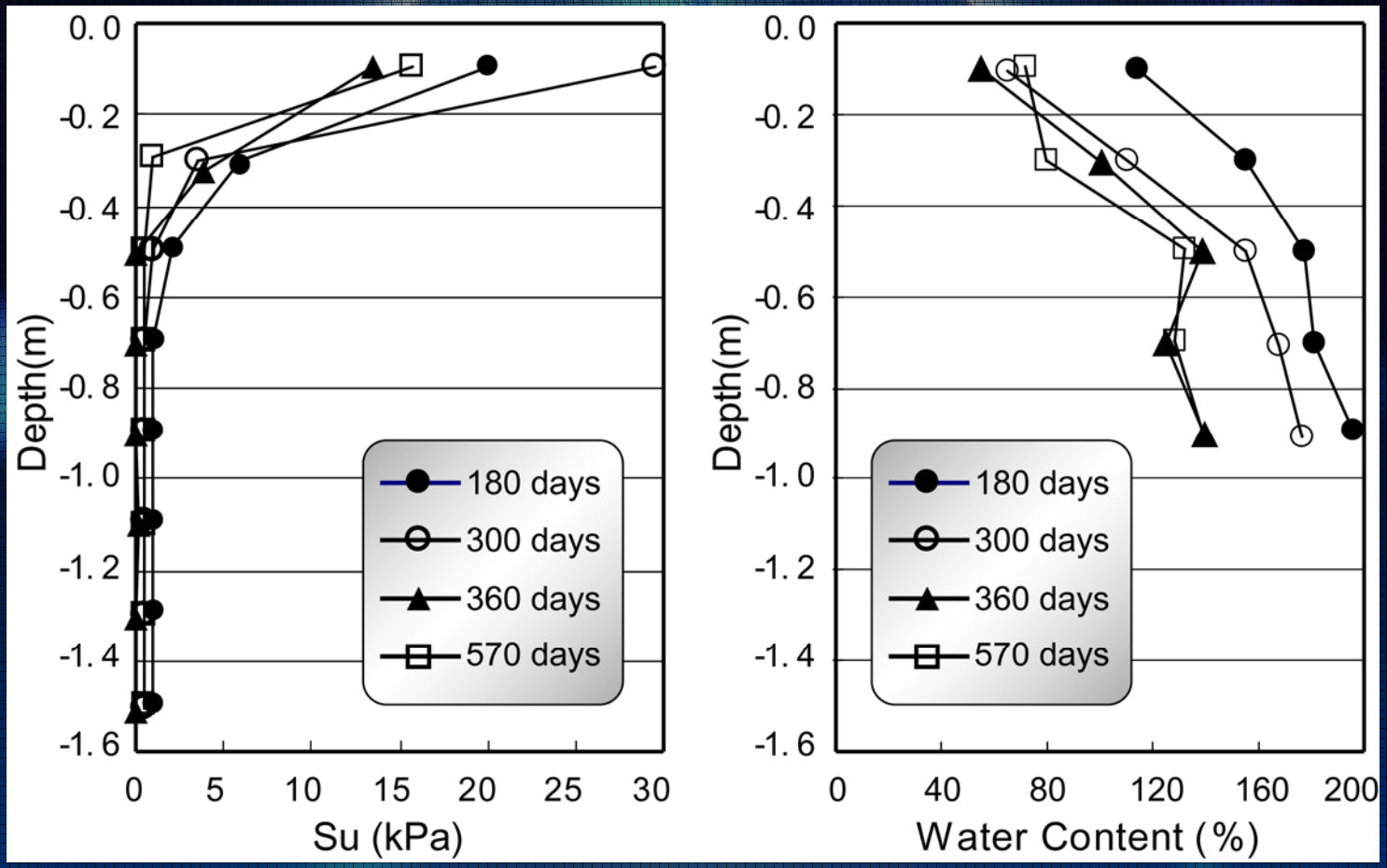


Container Terminal Area

Terminal Related Facility Area

Location	Operation load (kPa)	Allowable settlement (cm)
Container Terminal Area	30	10
Terminal Related Facility Area	15	30

Su & ω of dredged clay after application of PTM



(After Lee, Y.N. & Lee, S.W., 2003)

Onsite placement view of bamboo matting

- Surface treatment method of dredged clay