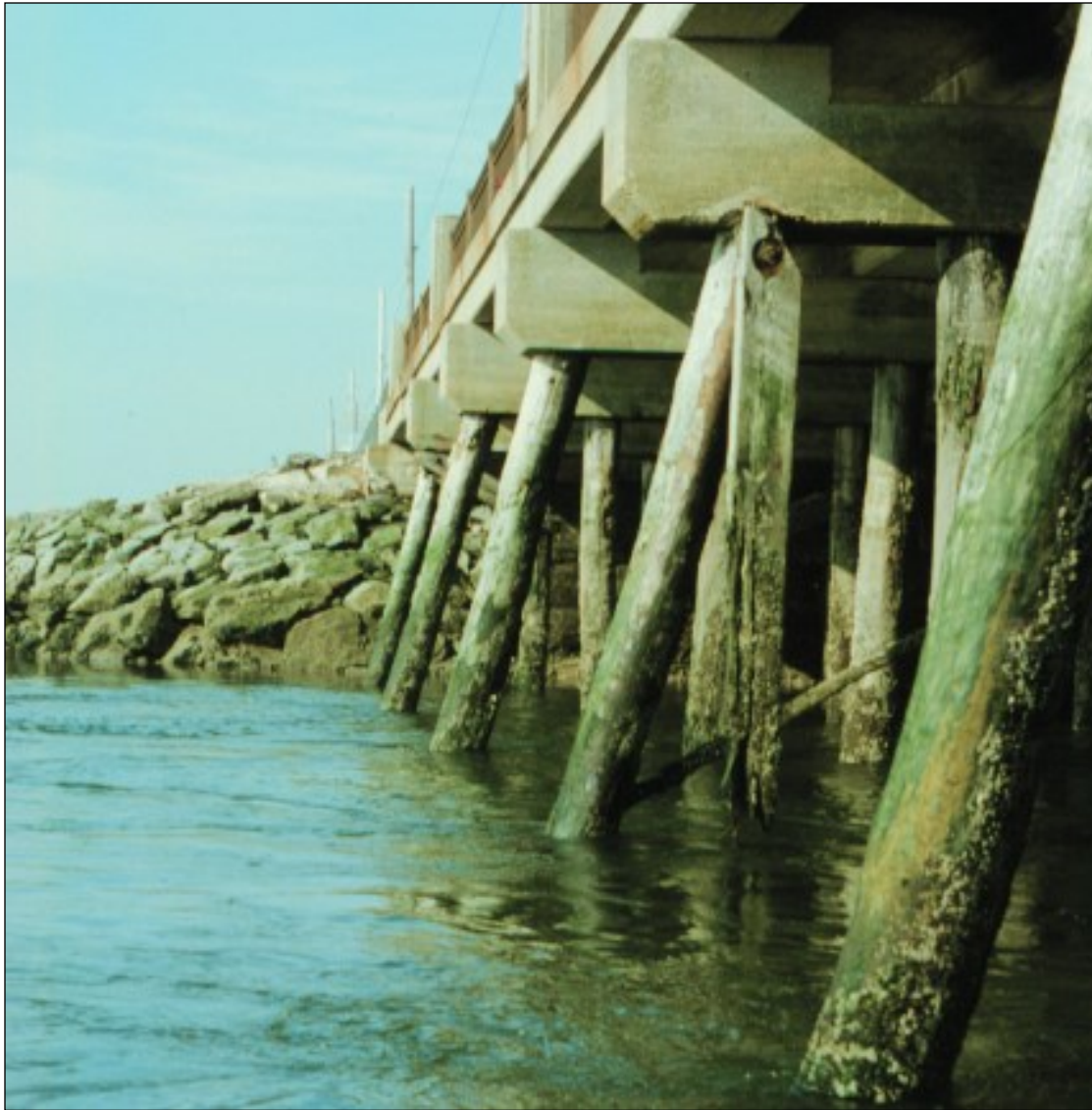


Case Study – Soft Clay Site Characterization



Location = Saugus,
Massachusetts

Deposit = thick
deposit of Boston
Blue Clay (BBC)

Design = replace
existing bridge
foundation → deep
foundation

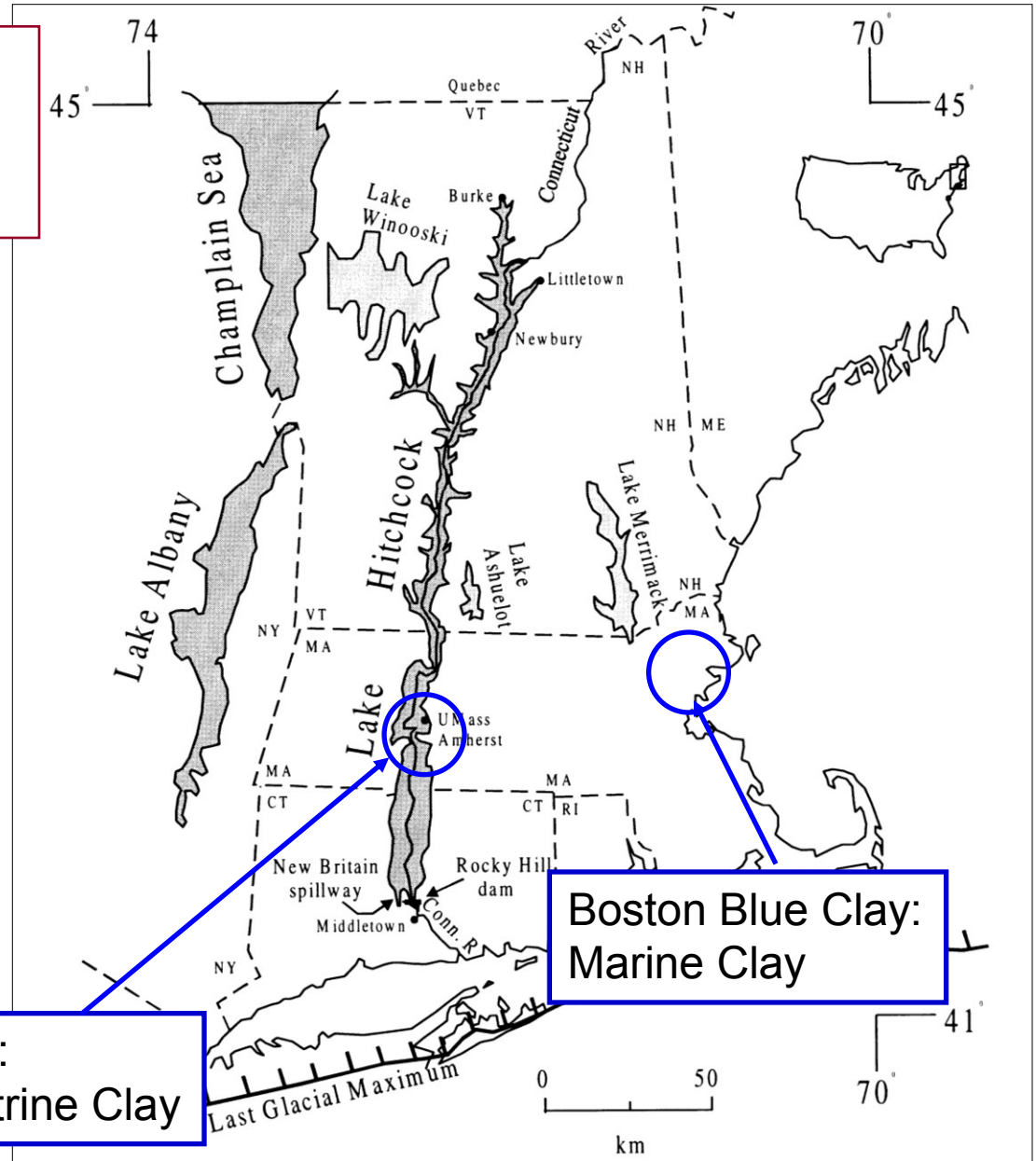
Boston Blue Clay, Saugus, MA Site

Saugus BBC:
Low PI marine clay of
low to medium
sensitivity



CVVC:
Lacustrine Clay

Boston Blue Clay:
Marine Clay



Site Characterization Program

Original Site Characterization Program:

1 In Situ Testing:

- Standard Penetration Test
- Field Vane Tests (FVT) in same borehole as SPT tests

2. Laboratory Testing on Thin walled Tube Samples

- Index (= Torvane) on ends of tubes
- Oedometer (Consolidation) tests
- Triaxial Tests

3. Design Requirements

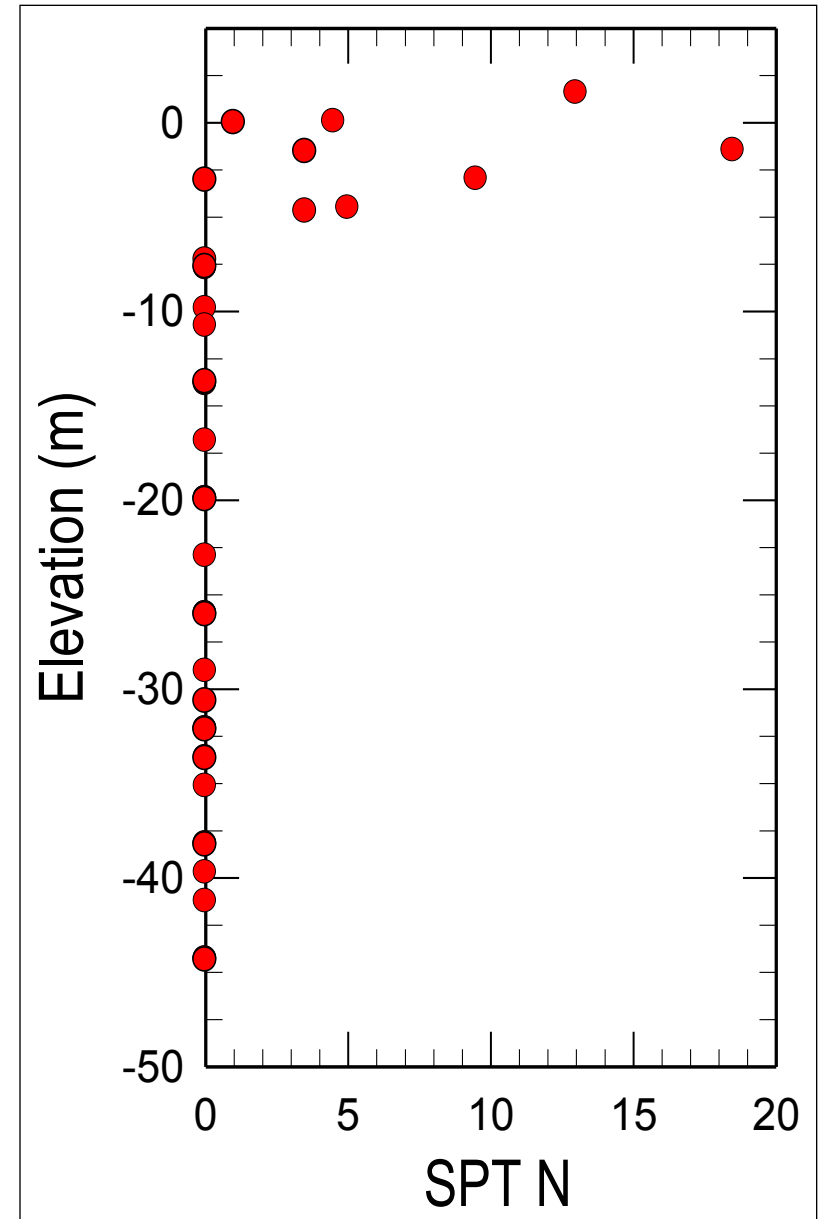
- Preconsolidation Stress, σ'_p
- Undrained Shear Strength, s_u



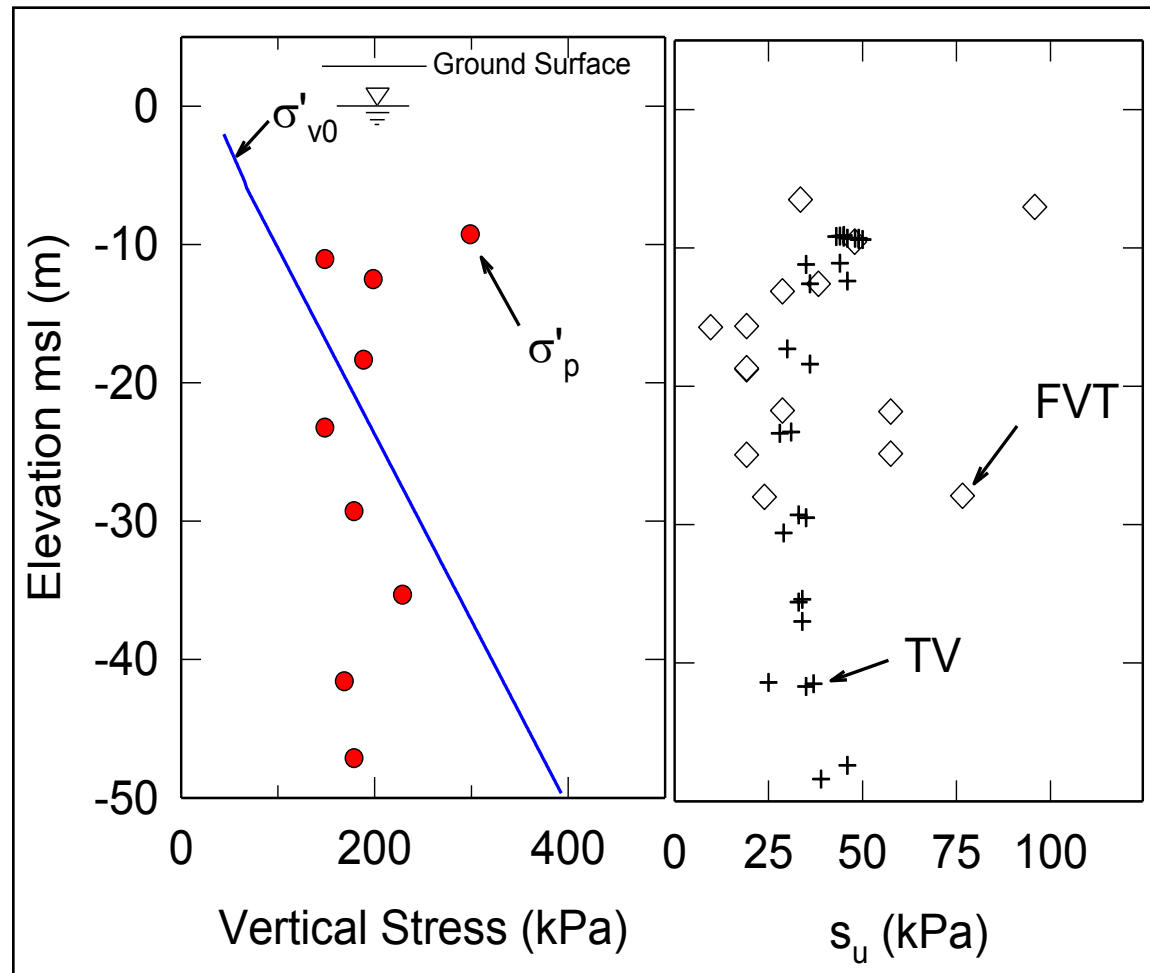
In Situ Testing Program = SPT

SPT Values highly
variable near ground
surface (= crust);

SPT = WOR below crust



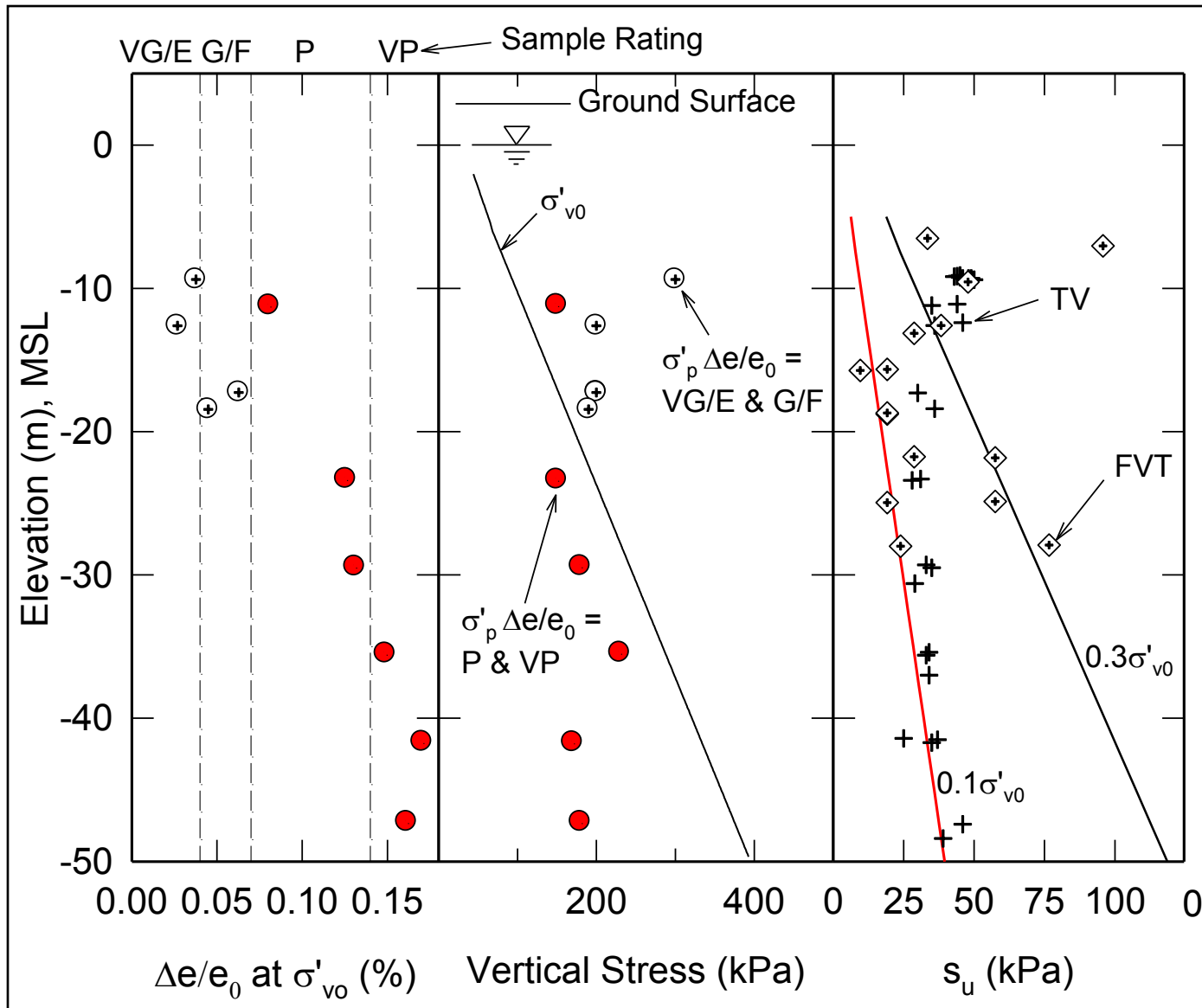
Preconsolidation Stress and Undrained Shear Strength Data



Note:

- Very low σ'_p values
- Highly scattered and low s_u values

Evaluation of Sample Quality



Inspect:

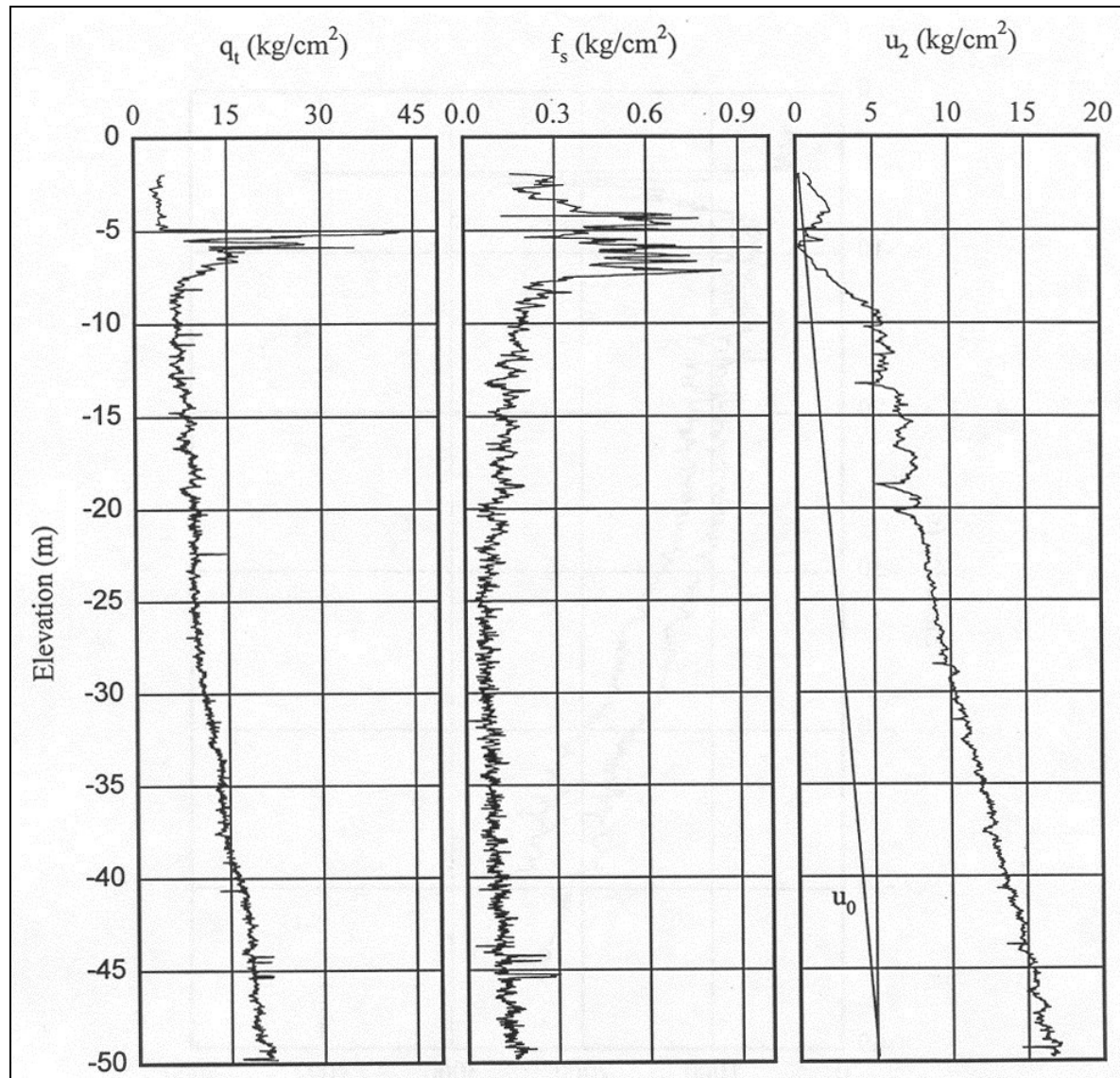
$\Delta e/e_0$ at σ'_{v0}
[Lunne et al. 1997]

Normalized
undrained
shear strength
data [s_u/σ'_{v0}]

Recommended CPTU Testing



CPTU Data – Boston Blue Clay, Saugus, MA



Boston Blue Clay

**Stiff
Clay
Crust**

**Uniform
Soft
Clay**

SPT N = WOR
(i.e., = 0)

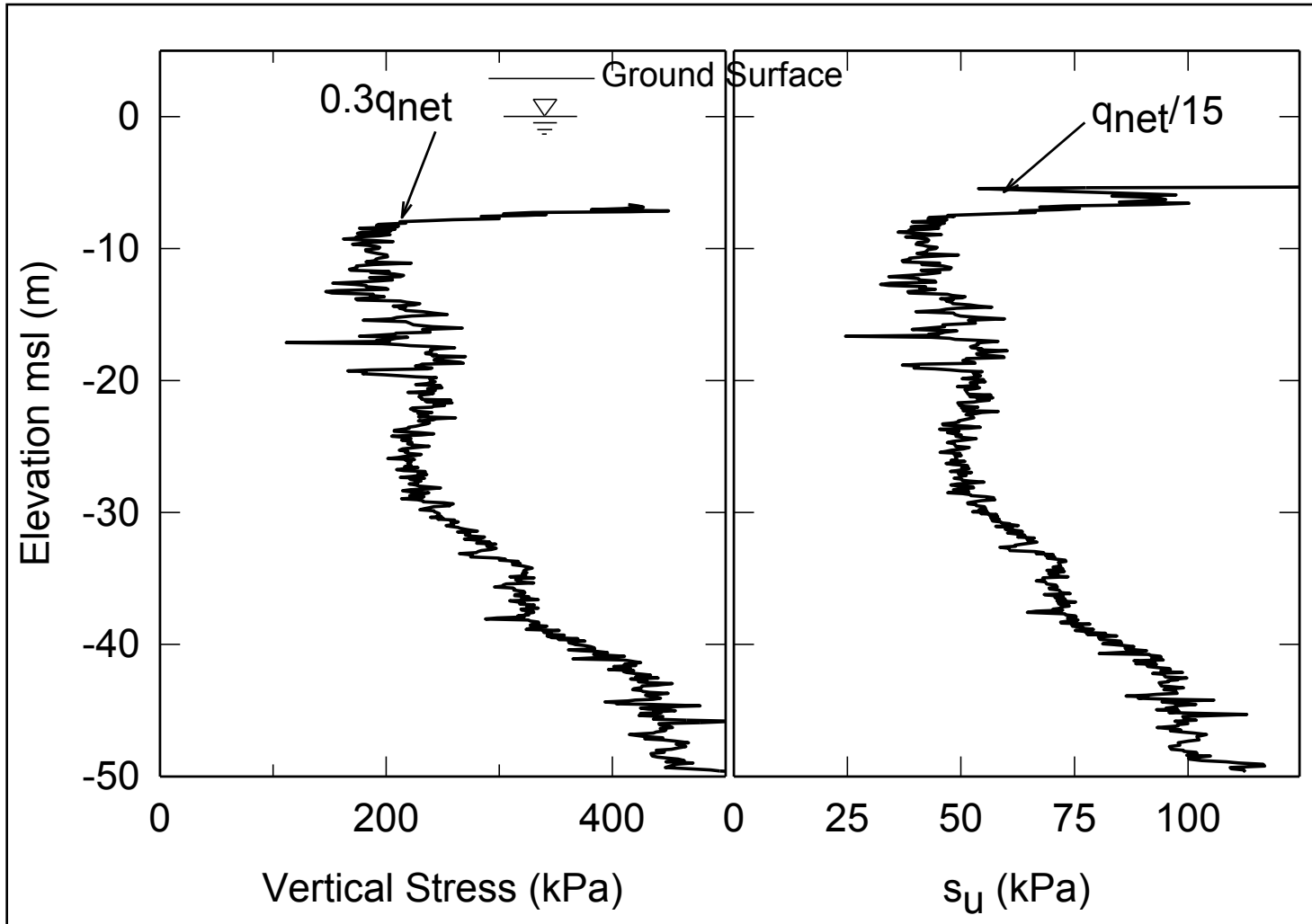
Linear increase in
 q_t and u_2 with
depth

High u_2 relative to
 u_0

Interpreted CPTU Data

$$\sigma'_p = kq_{\text{net}} = k(q_t - \sigma_{v0})$$

$$s_u = q_{\text{net}}/N_{kt} = (q_t - \sigma_{v0})/N_{kt}$$



N_{kt} for
 $s_u(\text{ave}) = 12$
to 17

Final Composite Profiles

