Griffith UNIVERSITY

LECTURE SERIES AND WORKSHOPS ON
GEOTECHNICAL ENGINEERING IN PRACTICE

Compaction Projects
Case Histories

K. Rainer Massarsch

Sweden

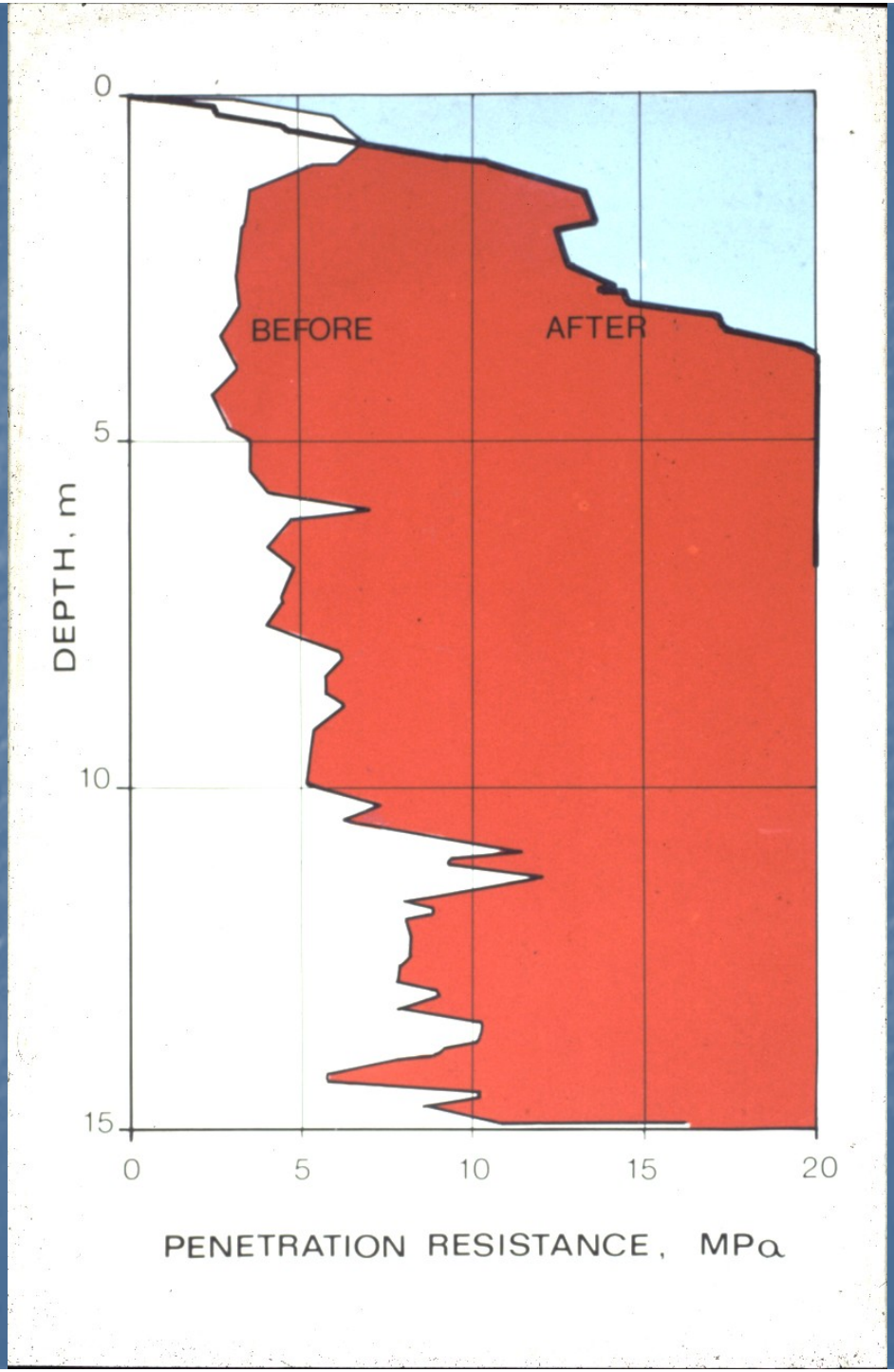
Soil Compaction – Changi Airport, Singapore

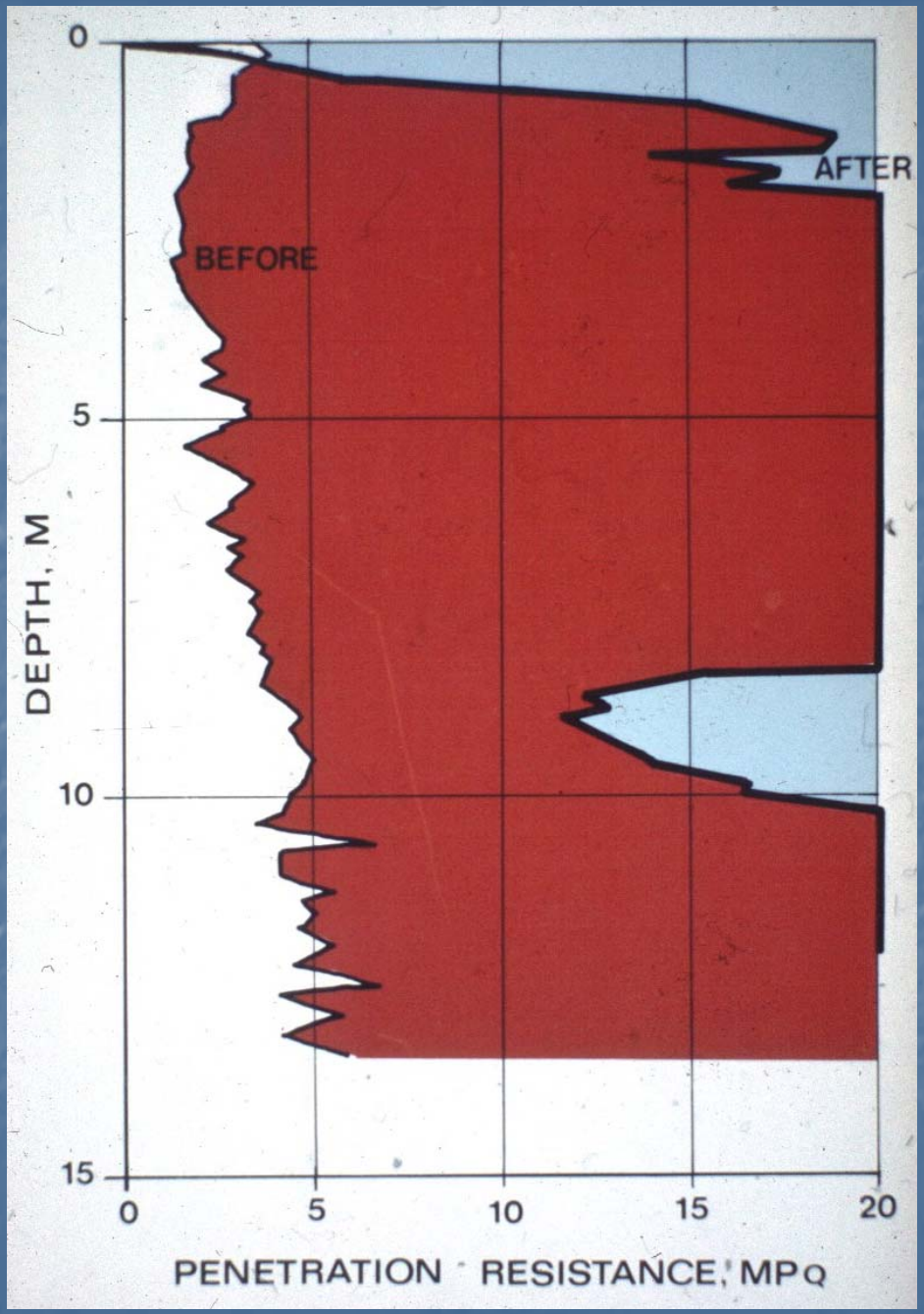
- Vibratory Compaction to 10 m depth
- Falling mass: 22 tons, 20 m
- Ground vibration measurements
- Calculation of ground impedance

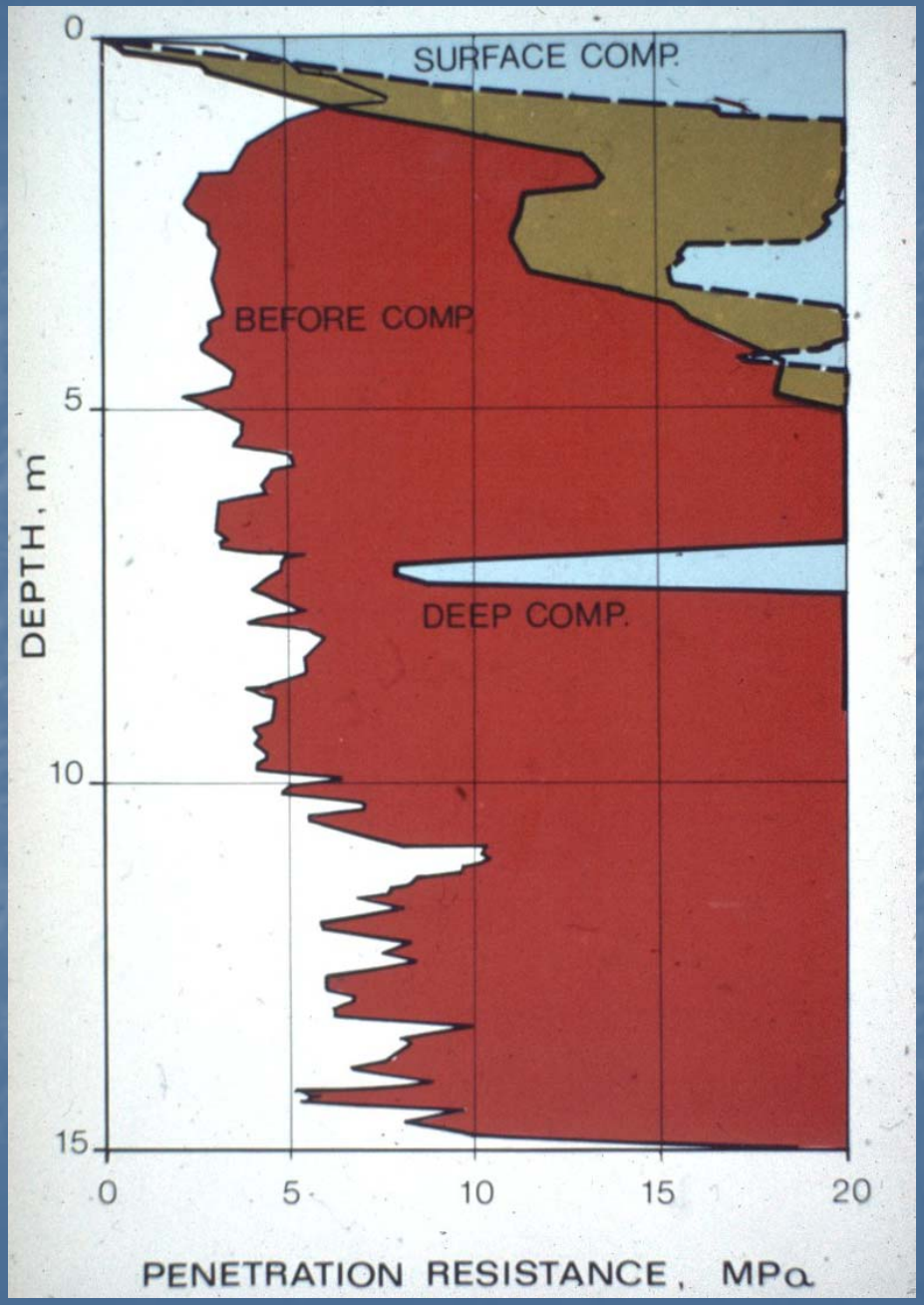
VibroWing Compaction Rostock Harbour

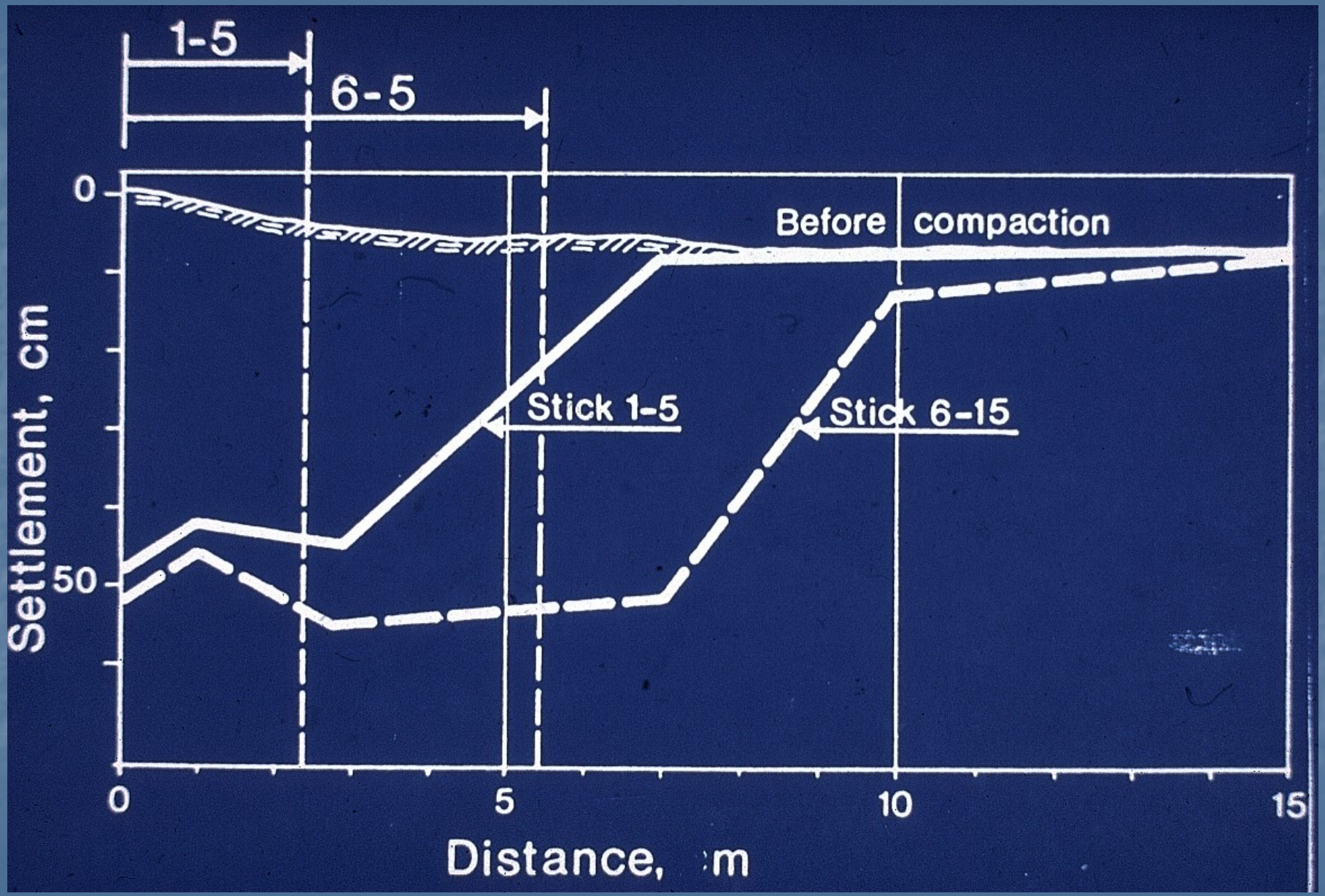

YRÉNS


TYRÉNS


0
5
10
15
DEPTH, m
BEFORE
AFTER
0
5
10
15
20
PENETRATION RESISTANCE, MPa


0
5
10
15
DEPTH, M
BEFORE
AFTER
0
5
10
15
20
PENETRATION RESISTANCE, MPa


SURFACE COMP.
BEFORE COMP.
DEEP COMP.
DEPTH, m
0
5
10
15
0
5
10
15
20
PENETRATION RESISTANCE, MPa

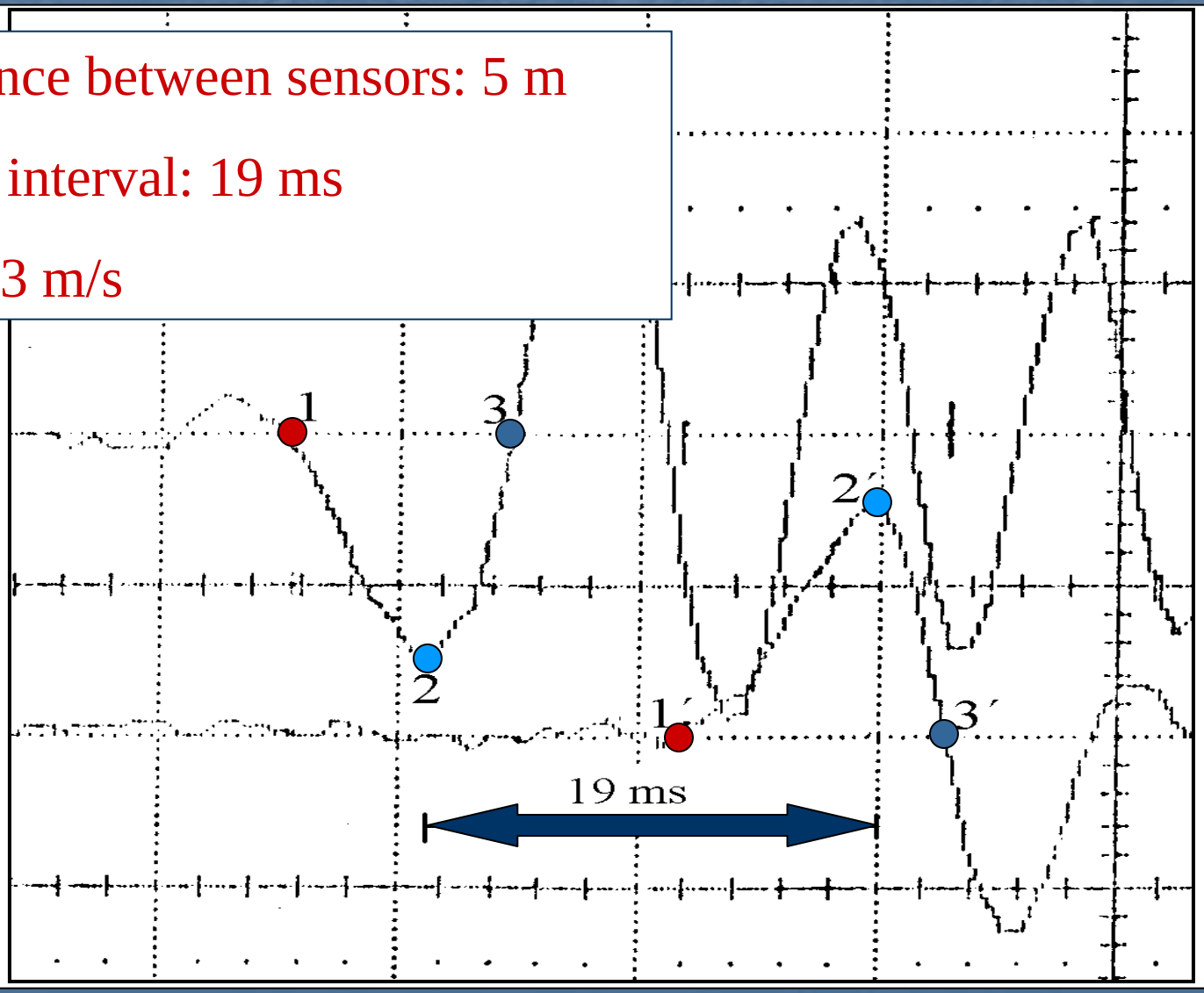

1-5
6-5
0
Before compaction
Stick 1-5
Stick 6-15
50
Settlement, cm
0
5
10
15
Distance, m

Determination of first arrival time and time intervals

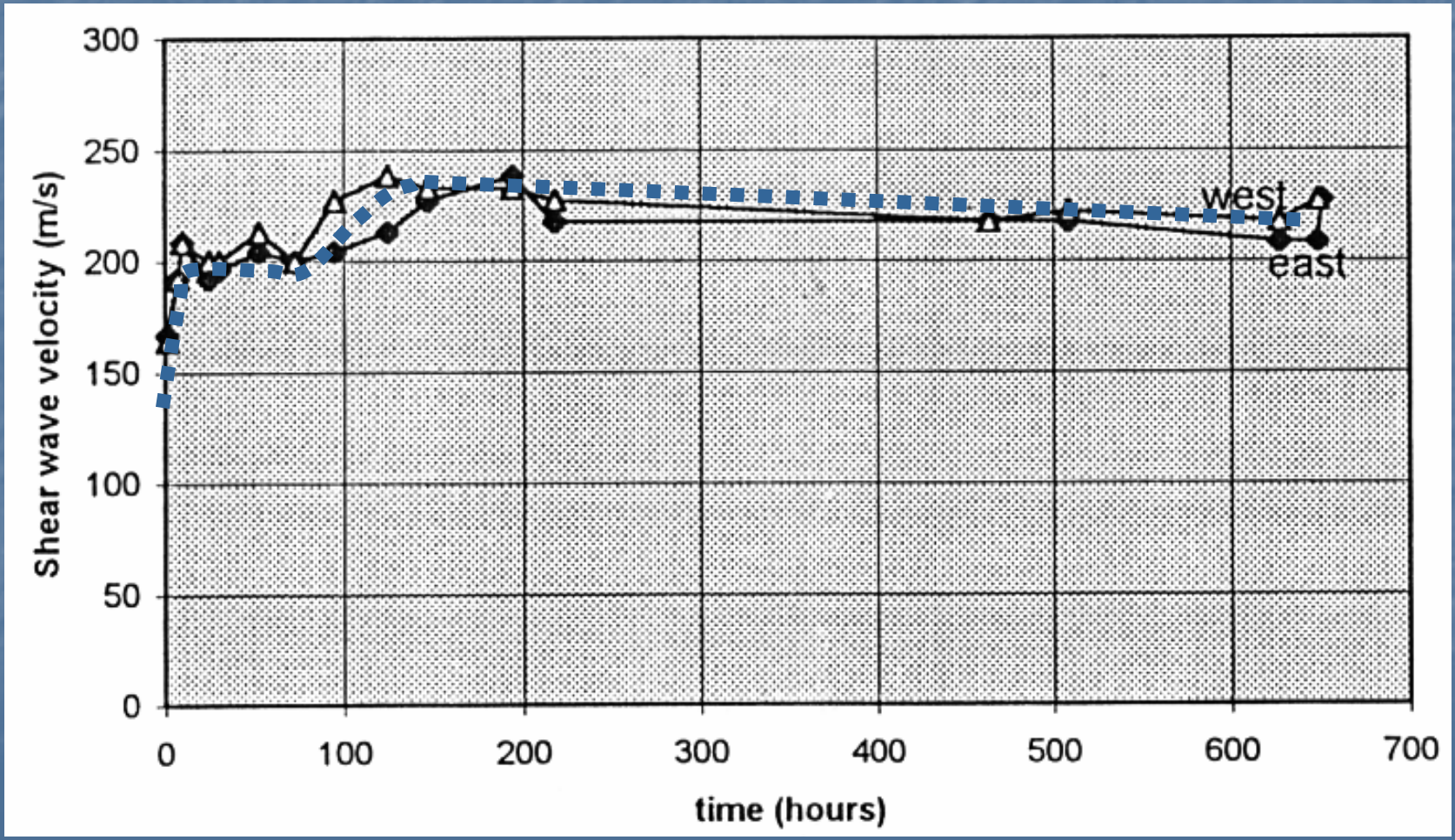
Distance between sensors: 5 m

Time interval: 19 ms

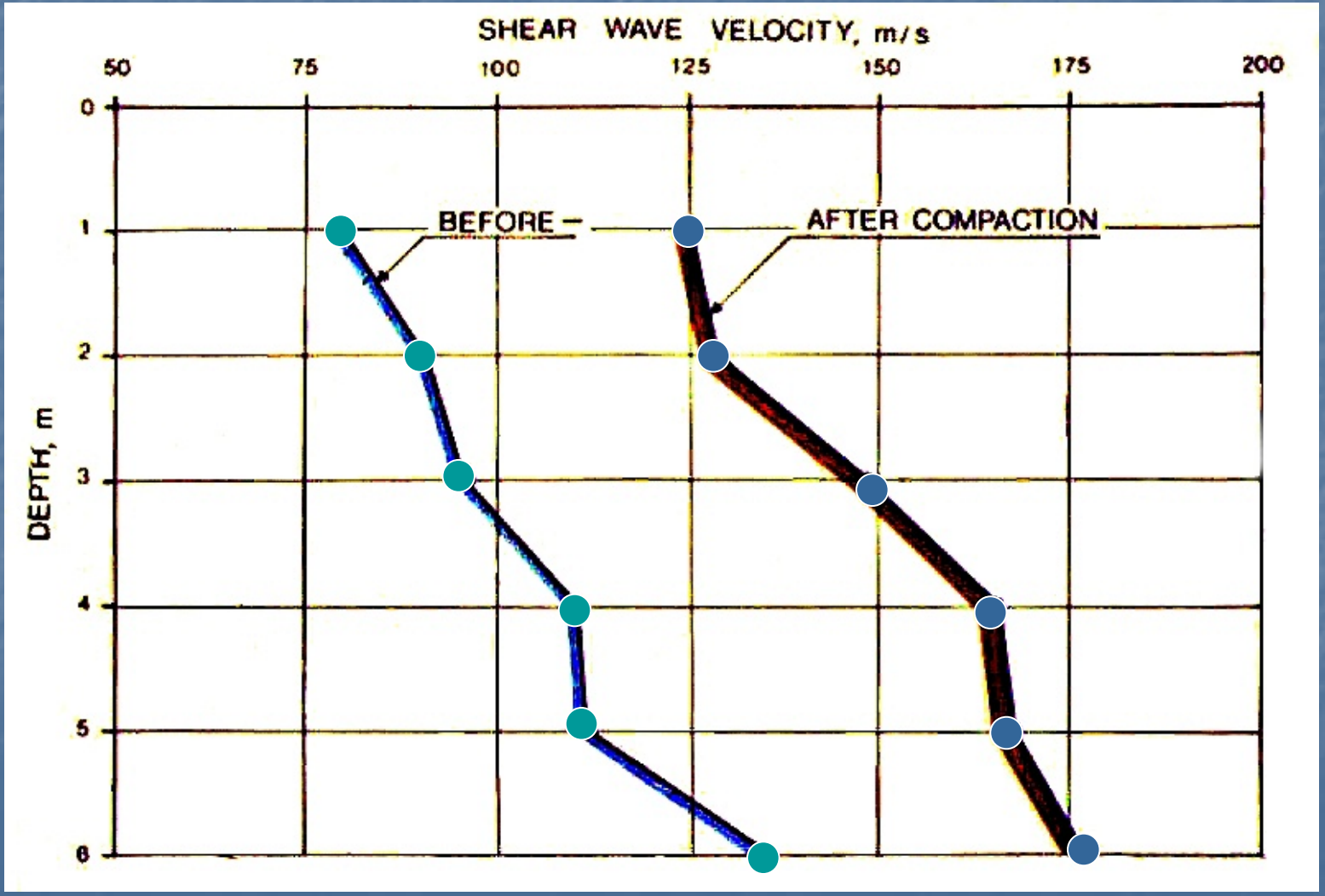
c_s: 263 m/s

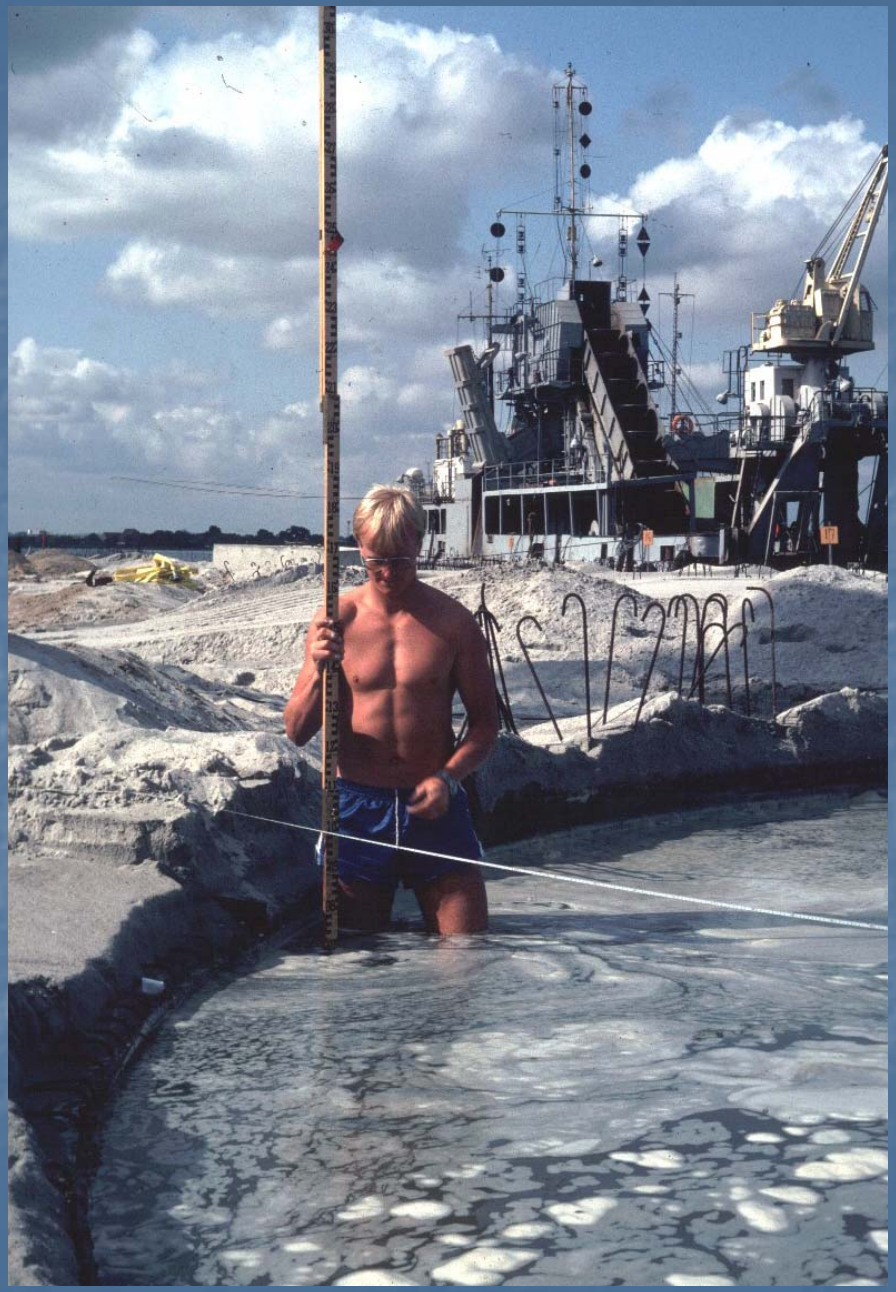


Variation of Shear Wave Velocity with Time after compaction



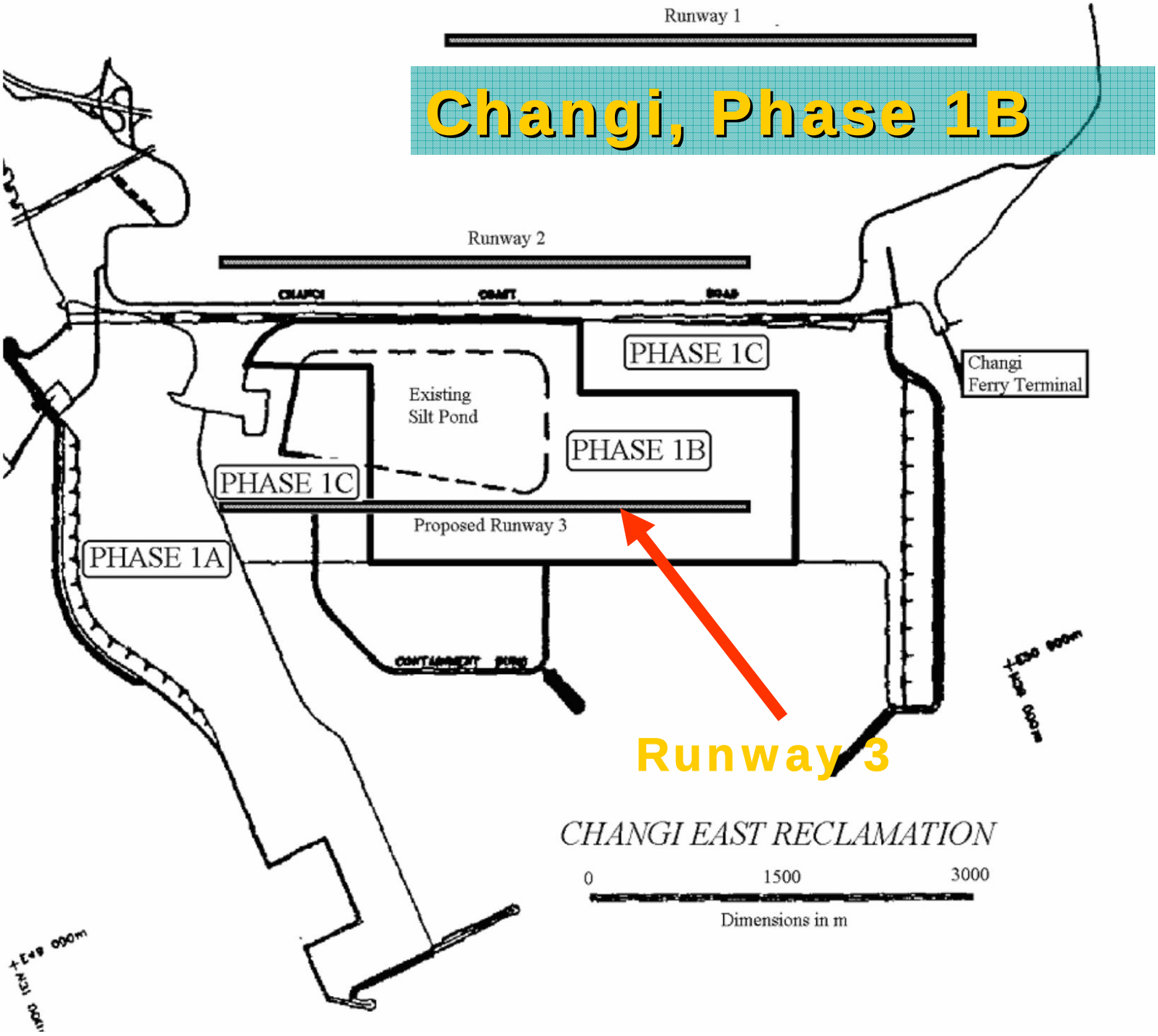
Results of Seismic Down-hole Test during Deep Vibratory Compaction



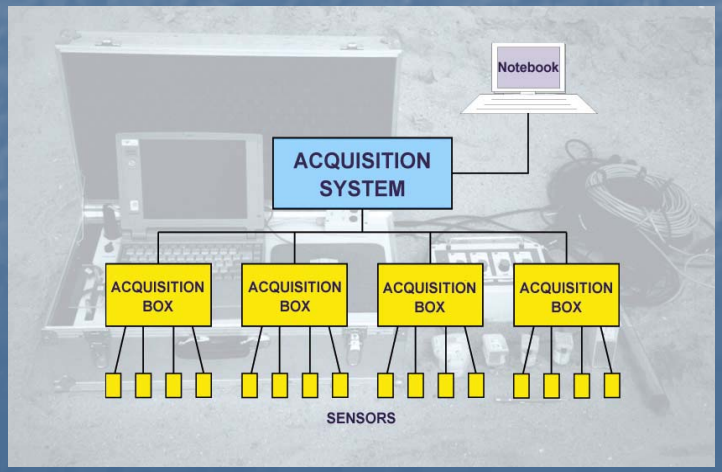


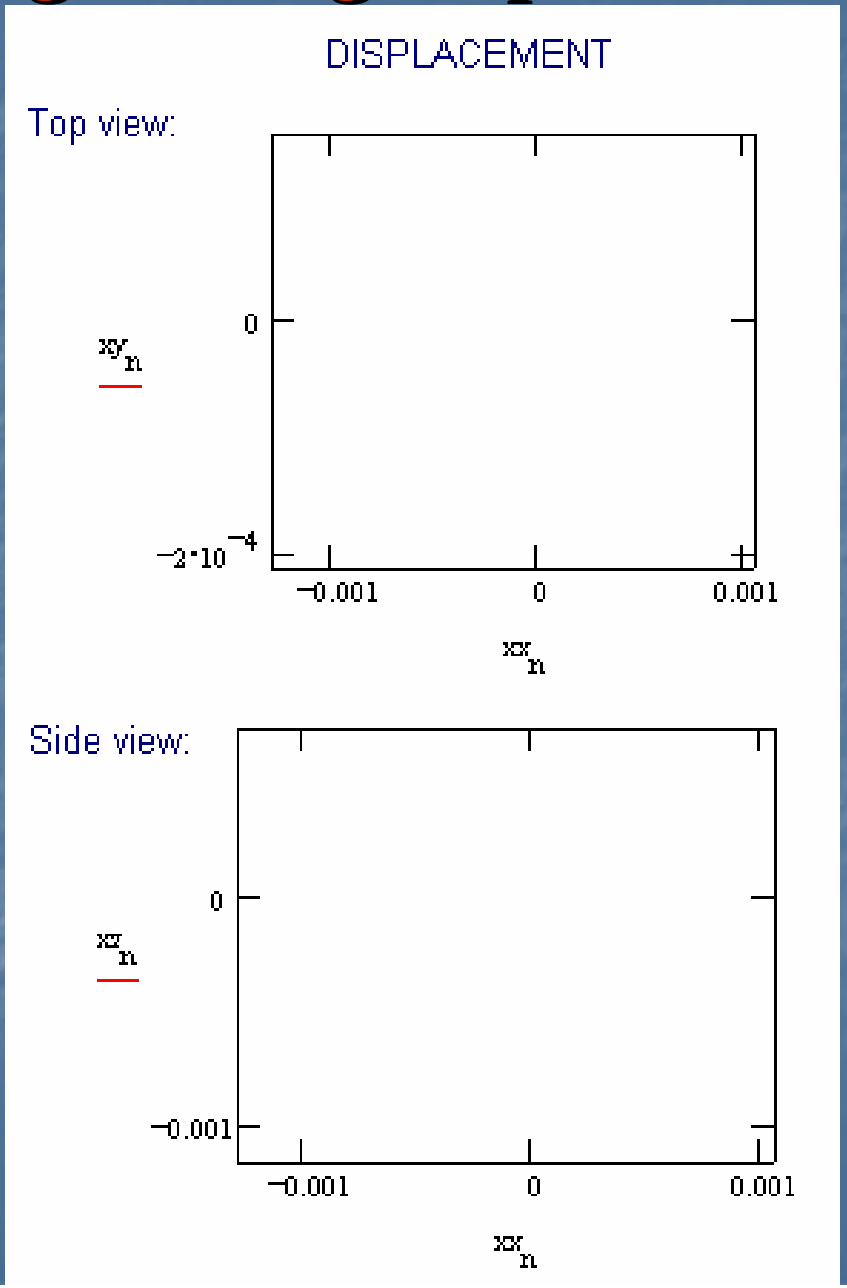

WISENT

Changi, Phase 1B

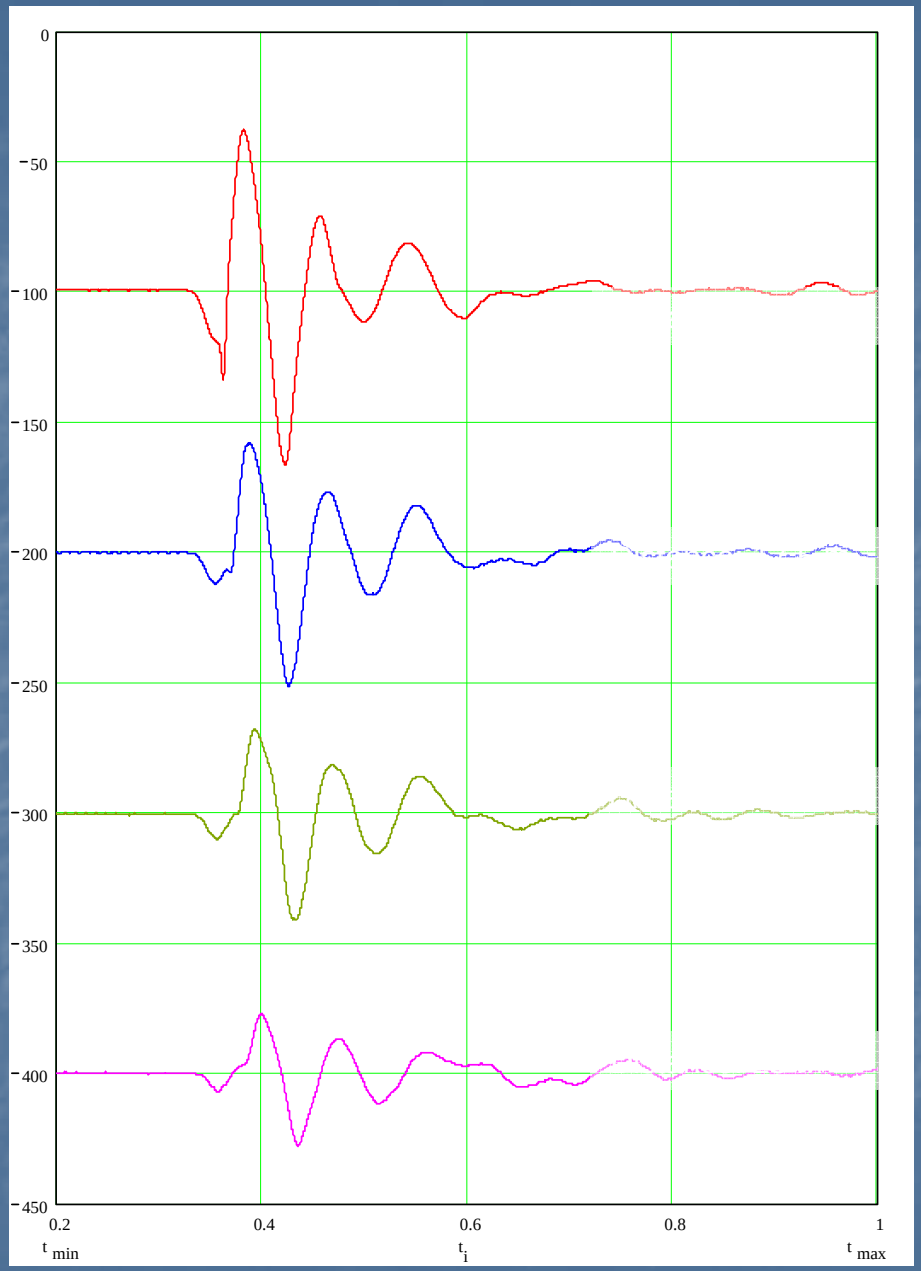


Vibration monitoring during impact





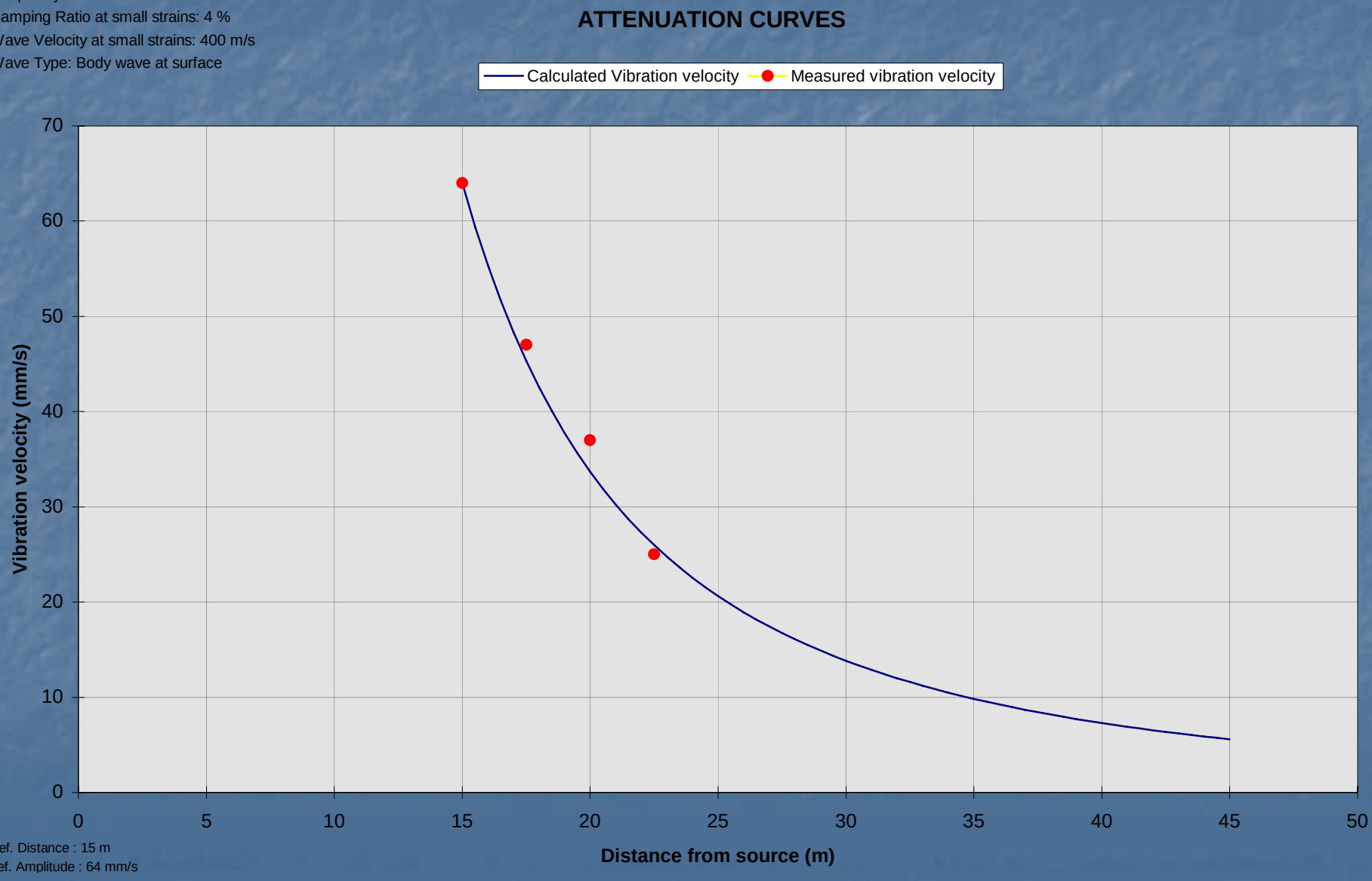
Particle Velocity (mm/s)



Time (sec)

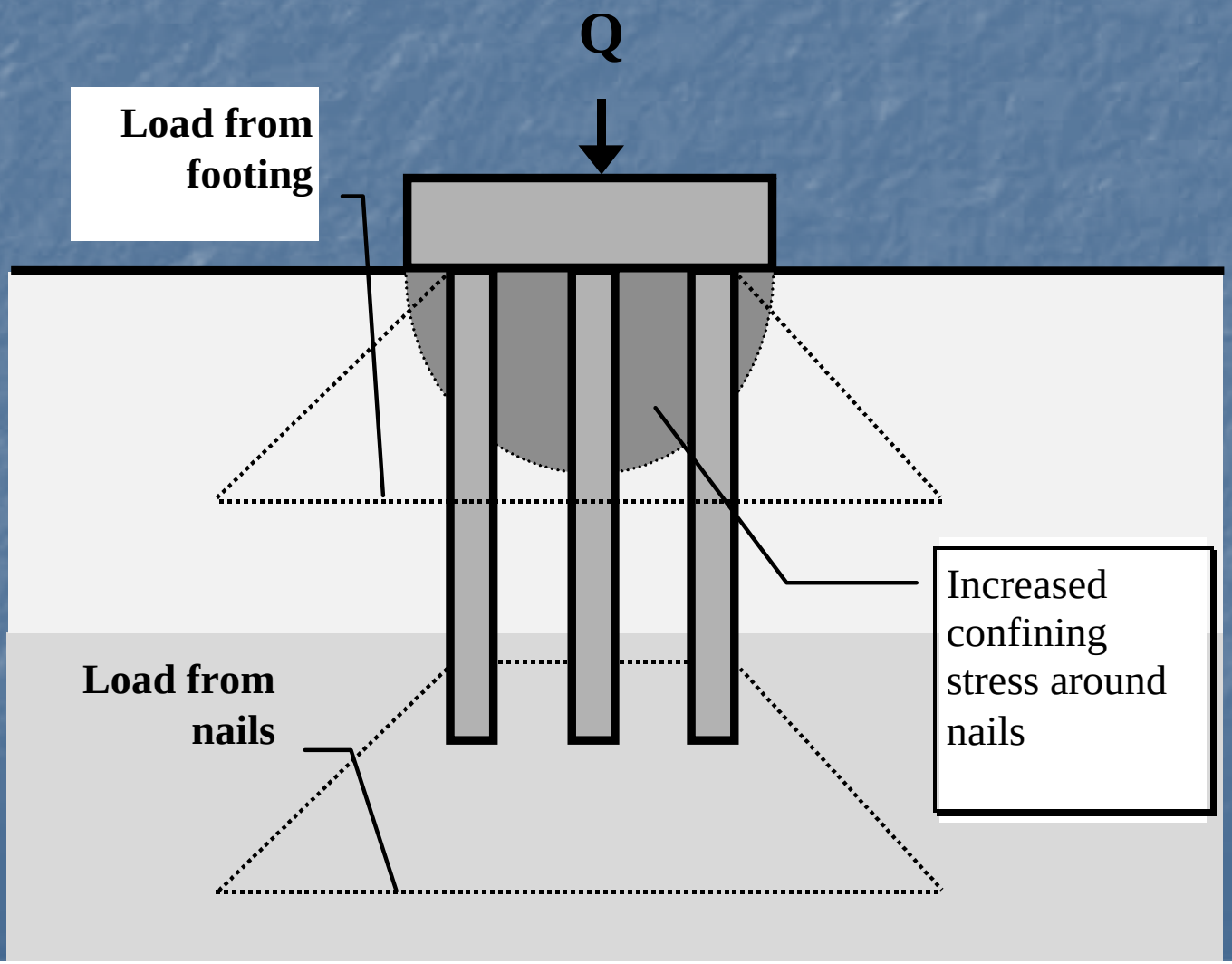
Wave Type: Body wave at surface
C=400 m/s

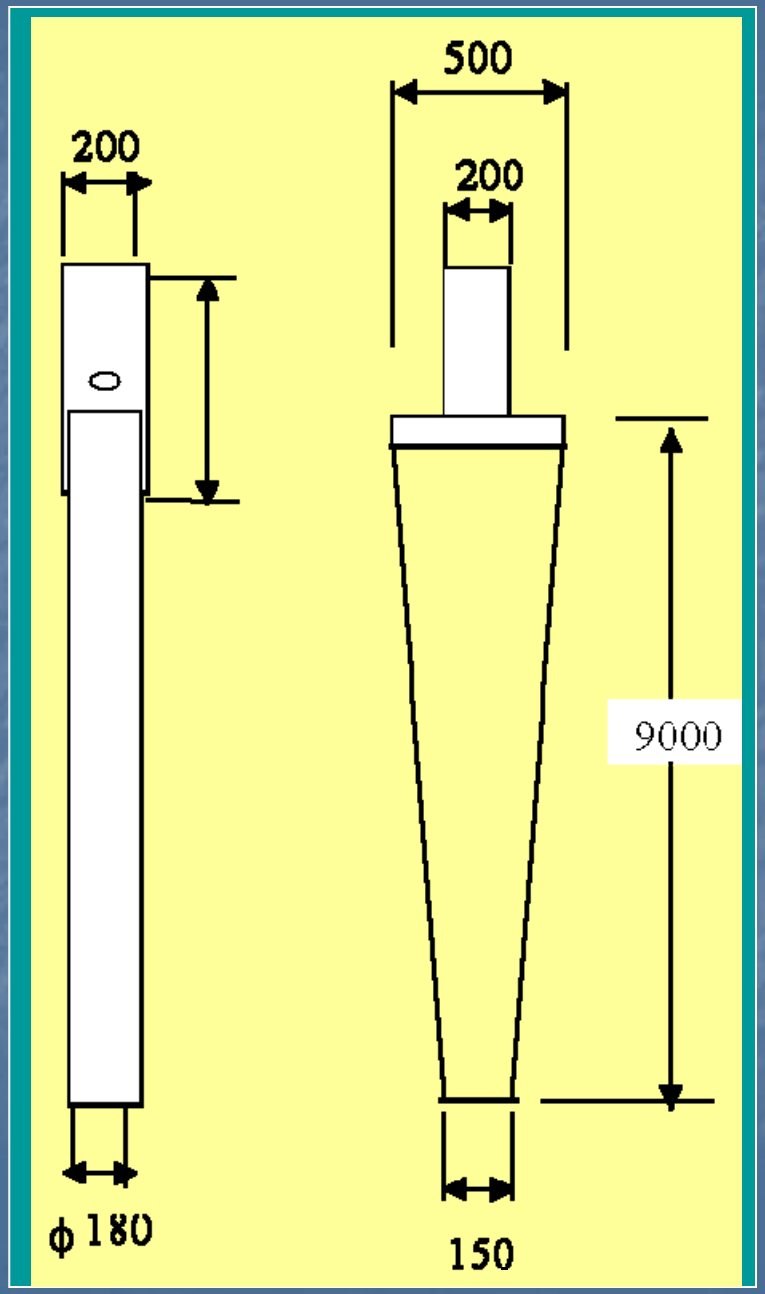
Frequency: 12 Hz
Damping Ratio at small strains: 4 %
Wave Velocity at small strains: 400 m/s
Wave Type: Body wave at surface

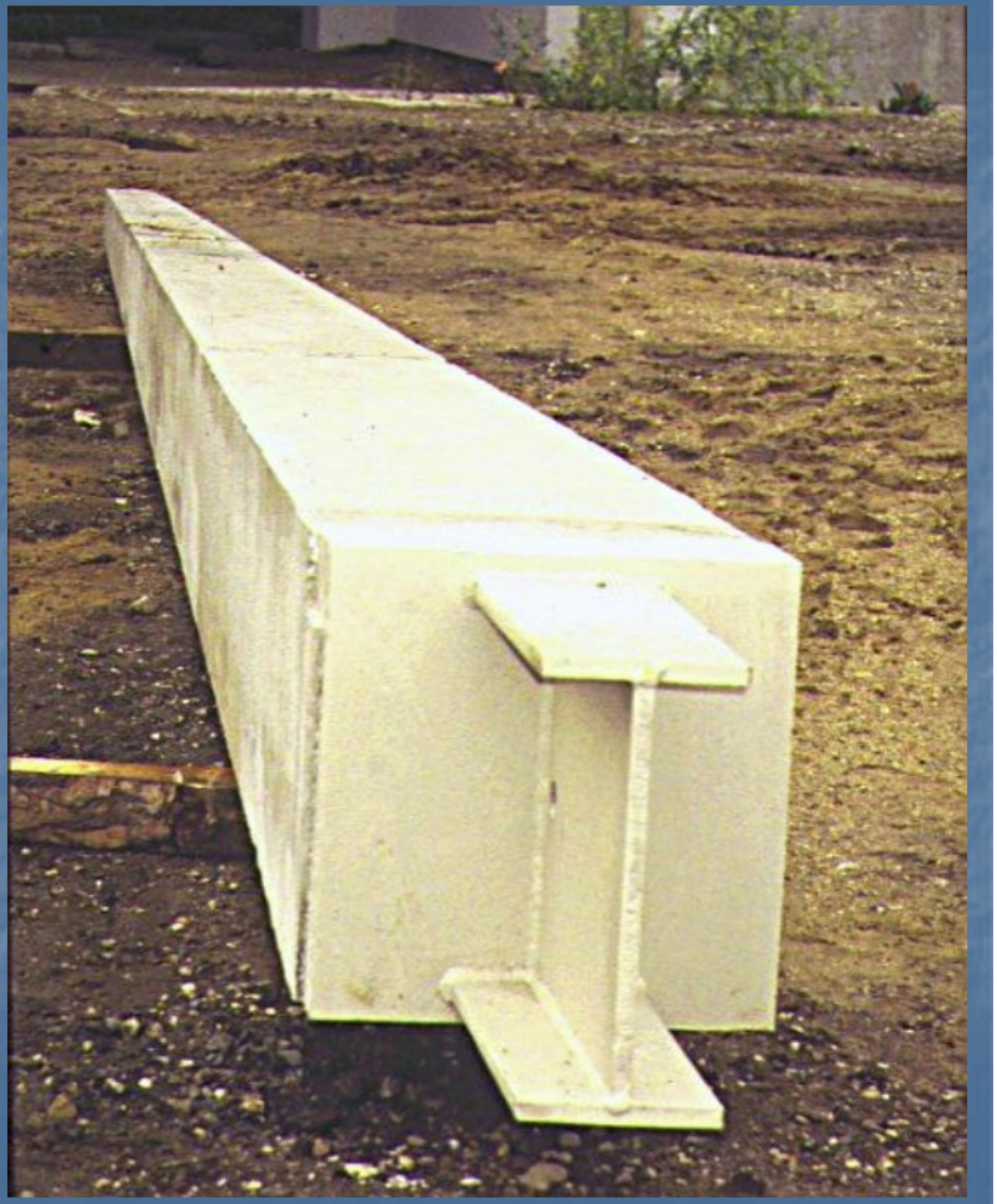


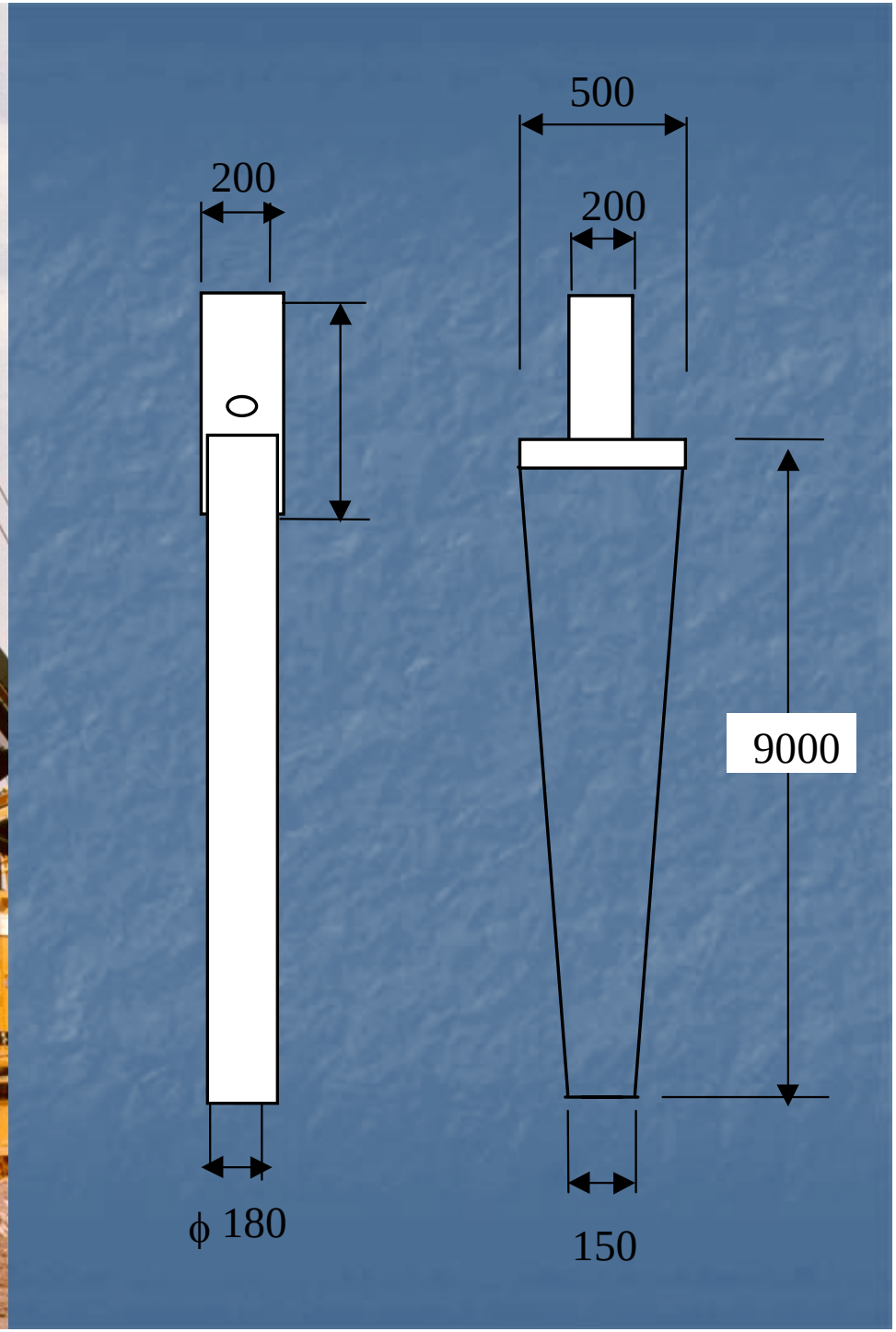
Ref. Distance : 15 m
Ref. Amplitude : 64 mm/s

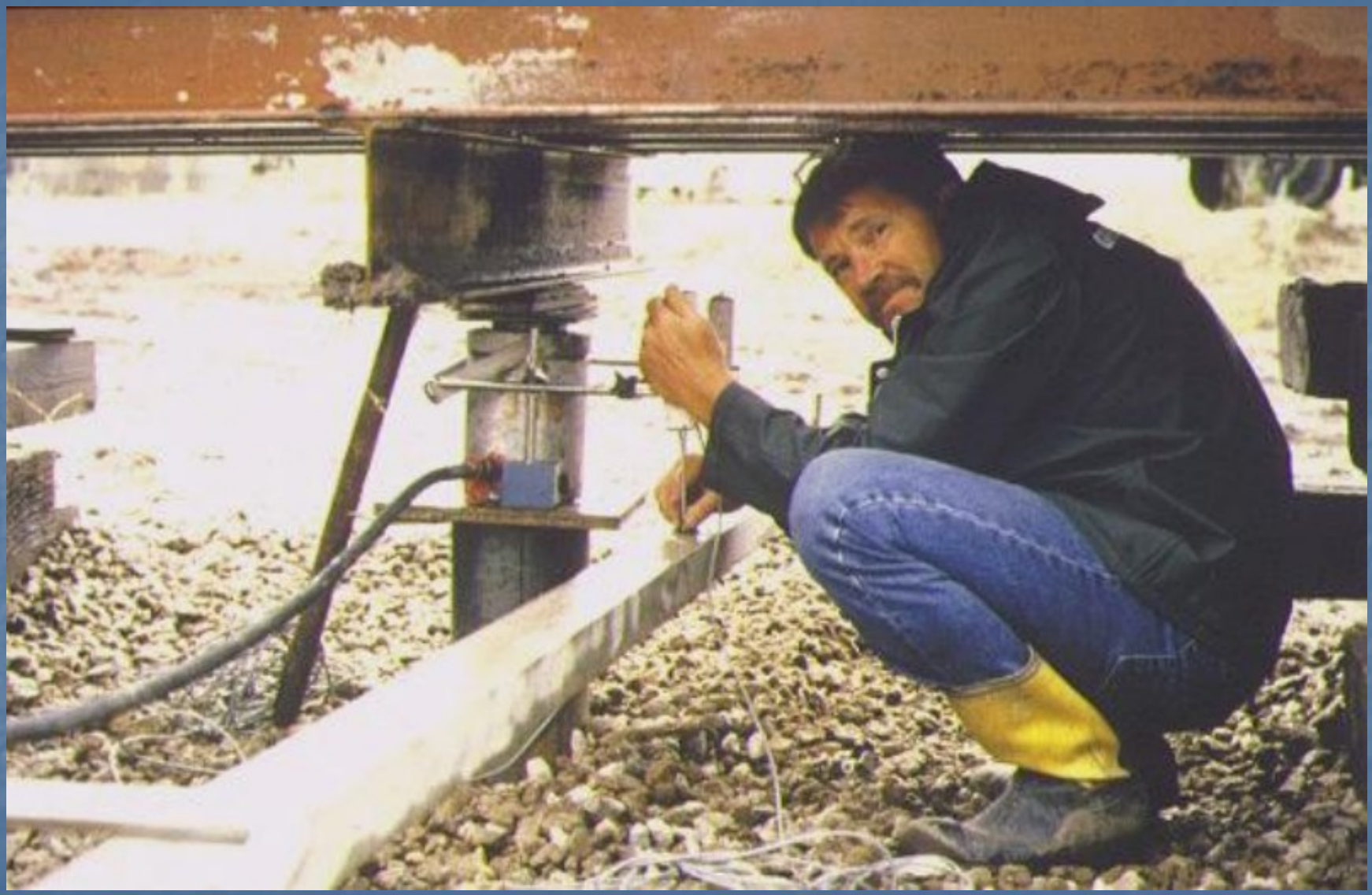
Vibratory-installed Soil Nails
Halle, Germany

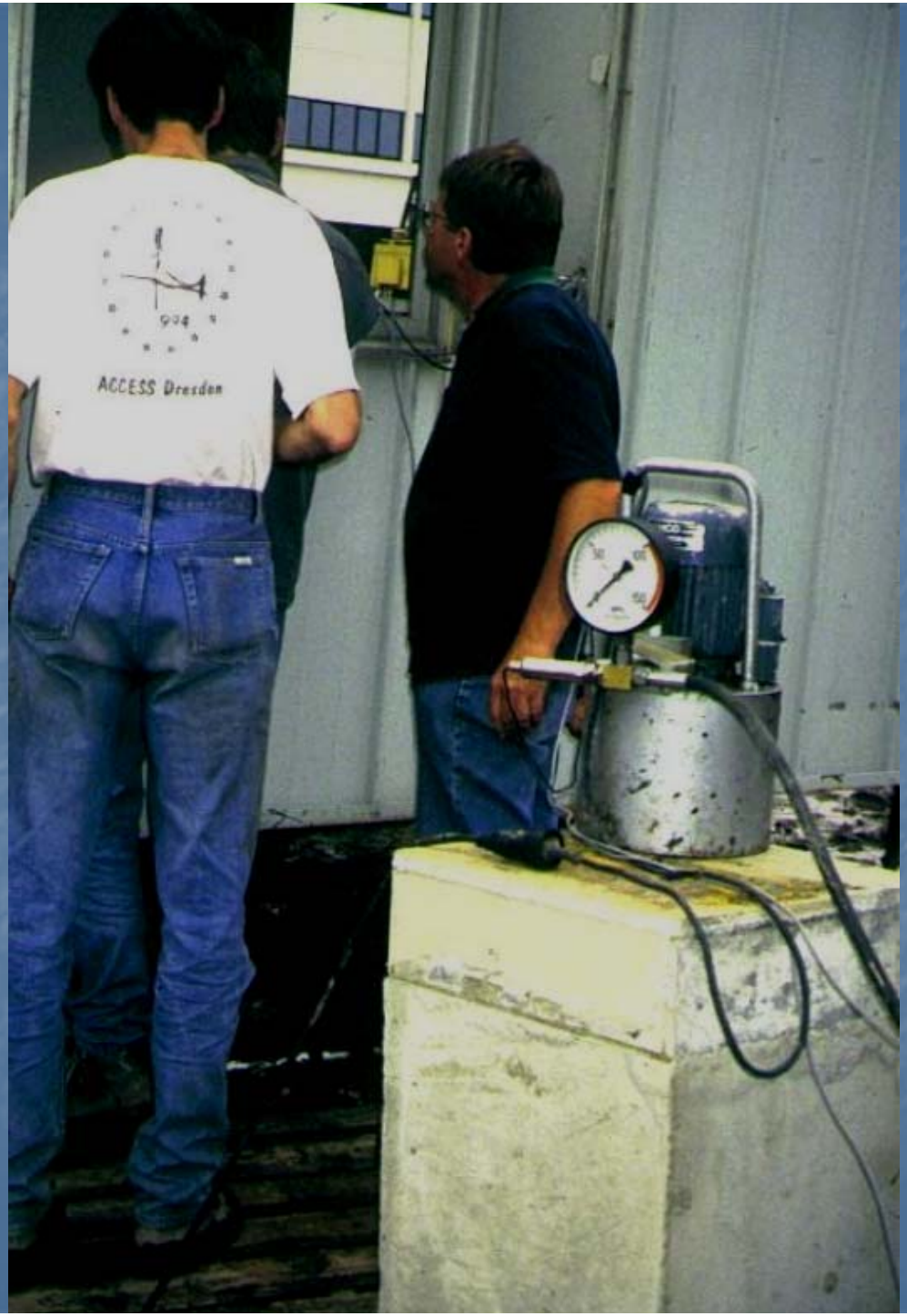



500
200
200
9000
ϕ 180
150

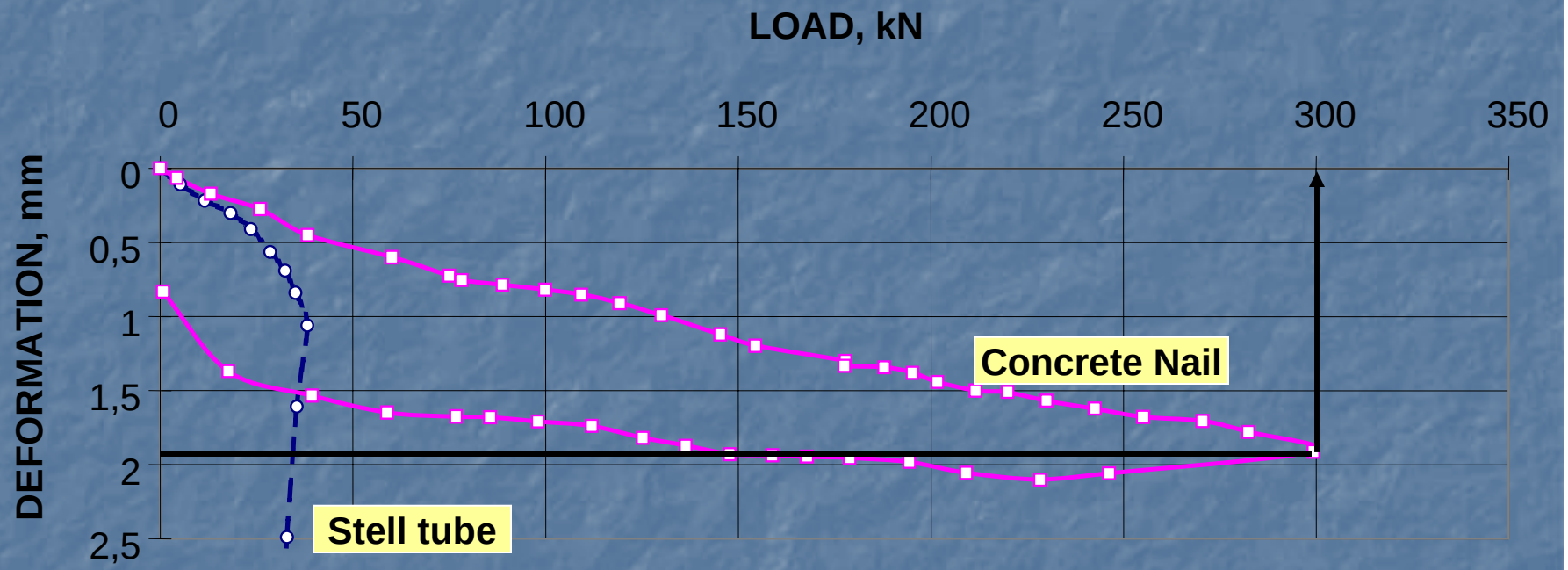



500
200
200
9000
ϕ 180
150




ACCESS Dresden

Results of Load -testing



Vibrator
MS 100

Electronic process control

Nail

Monitoring unit

Geophones