

**מגדל מגורים במגרש MIDTOWN
מבט ממצר- משה צור אדריכלים
קונסטרקציה ישראל דוד מהנדסים**



MIDTOWN מגדל מגורים במגרש מבט מצפון-משה צור אדריכלים

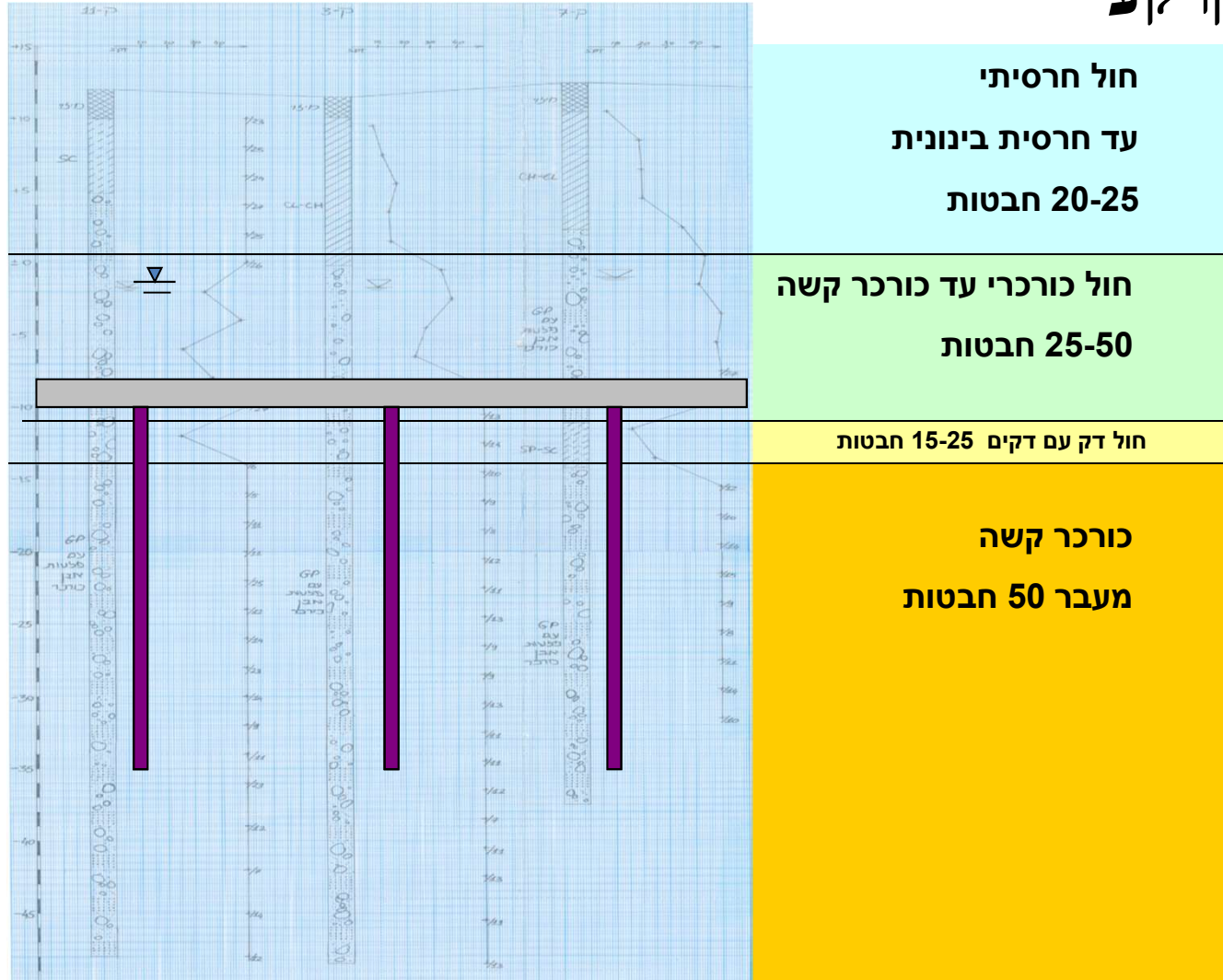


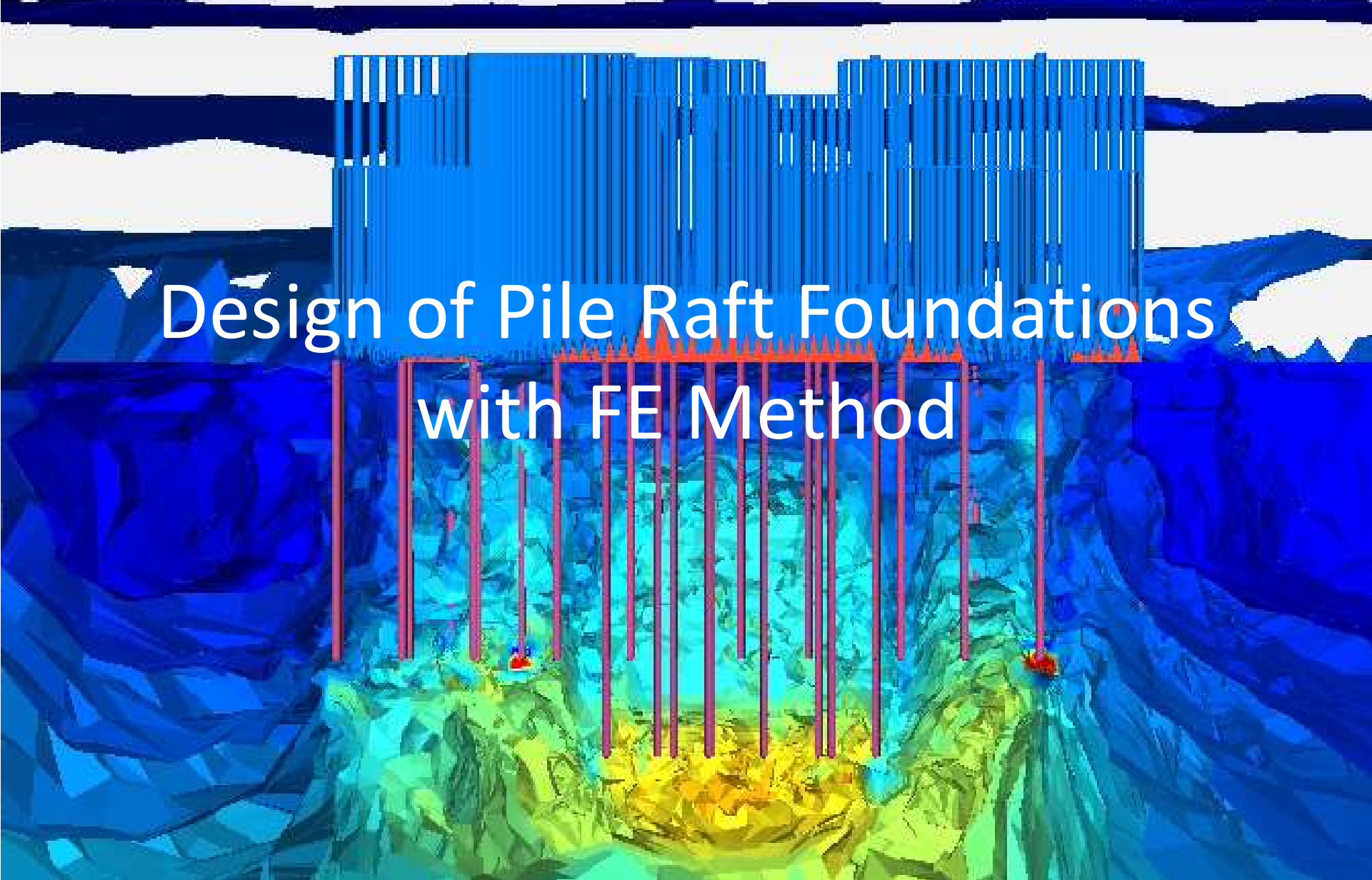
MIDTOWN מגדל מגורים במגרש מבט כללי- משה צור אדריכלים



MIDTOWN מגדל מגורים במגרש

חתך קרקע





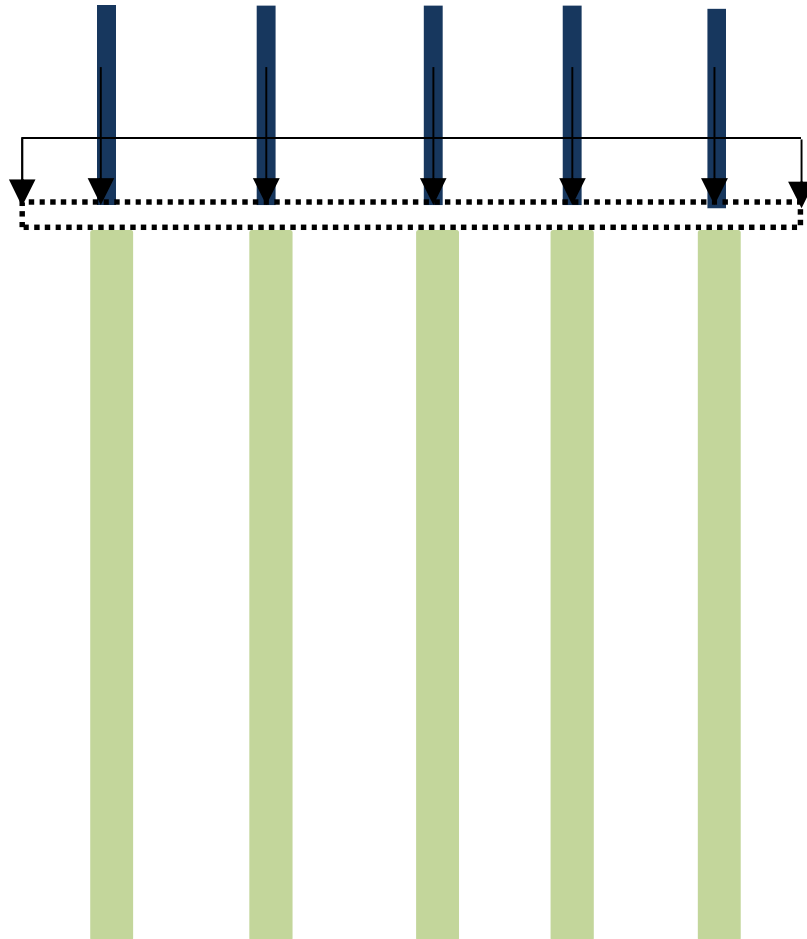
Design of Pile Raft Foundations with FE Method



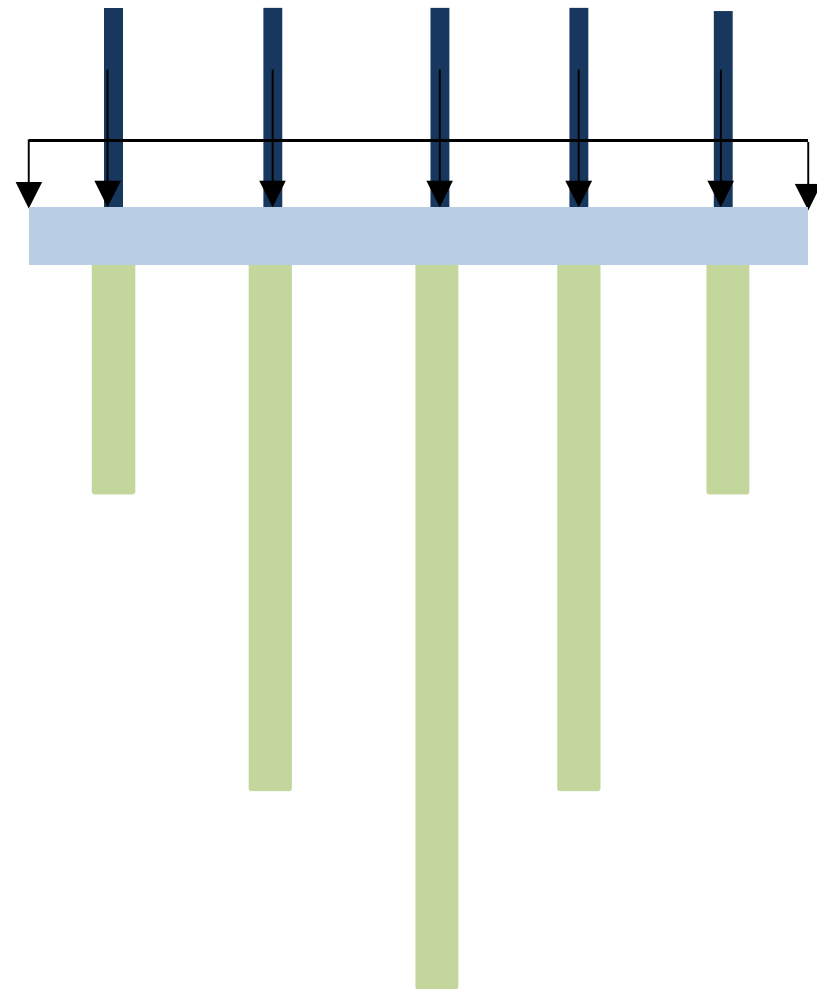
Introduction

Introduction: Pile and Pile Raft Foundations

Pile foundation

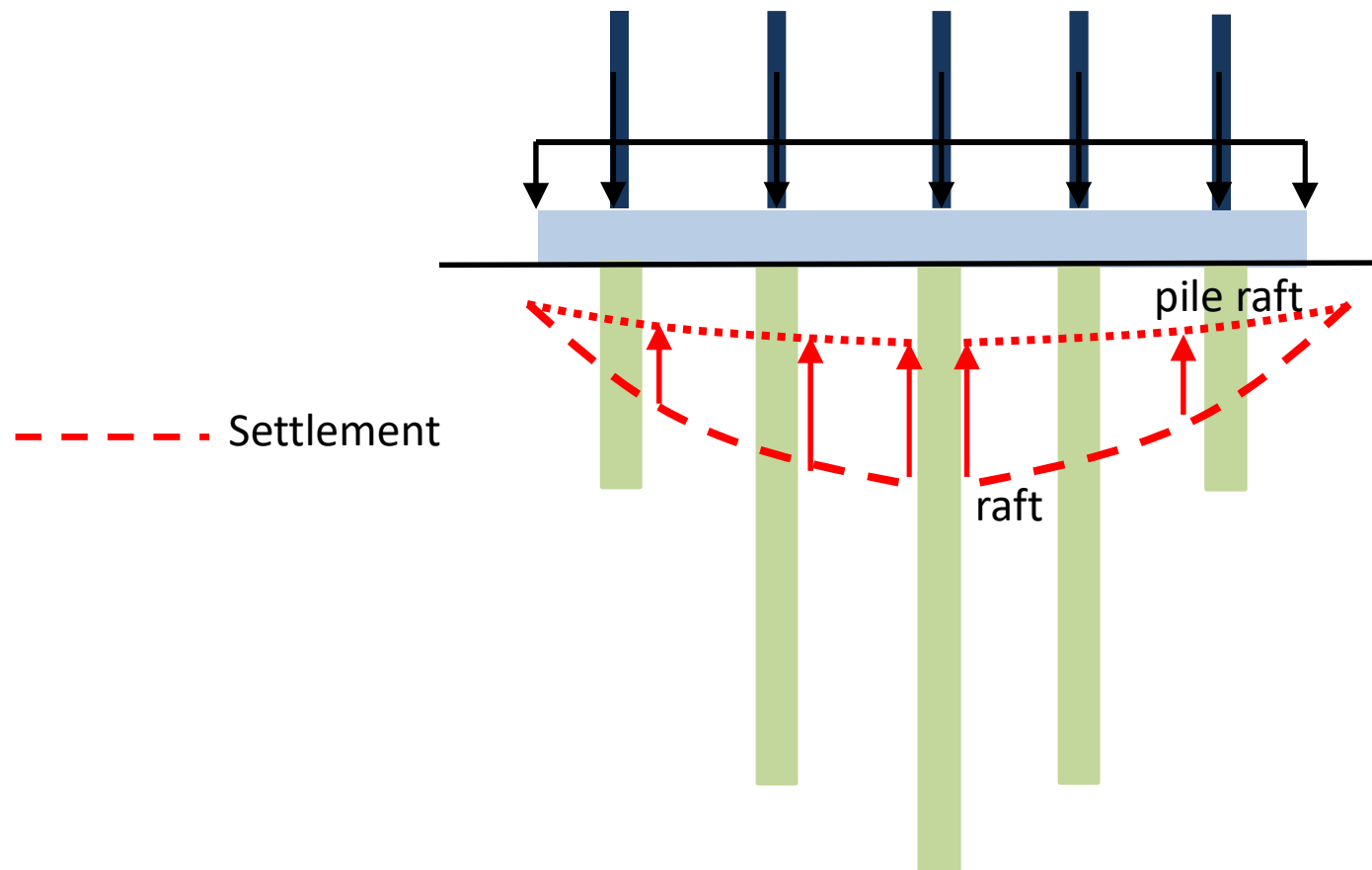


Pile Raft foundation



Pile Raft Foundation: main Idea

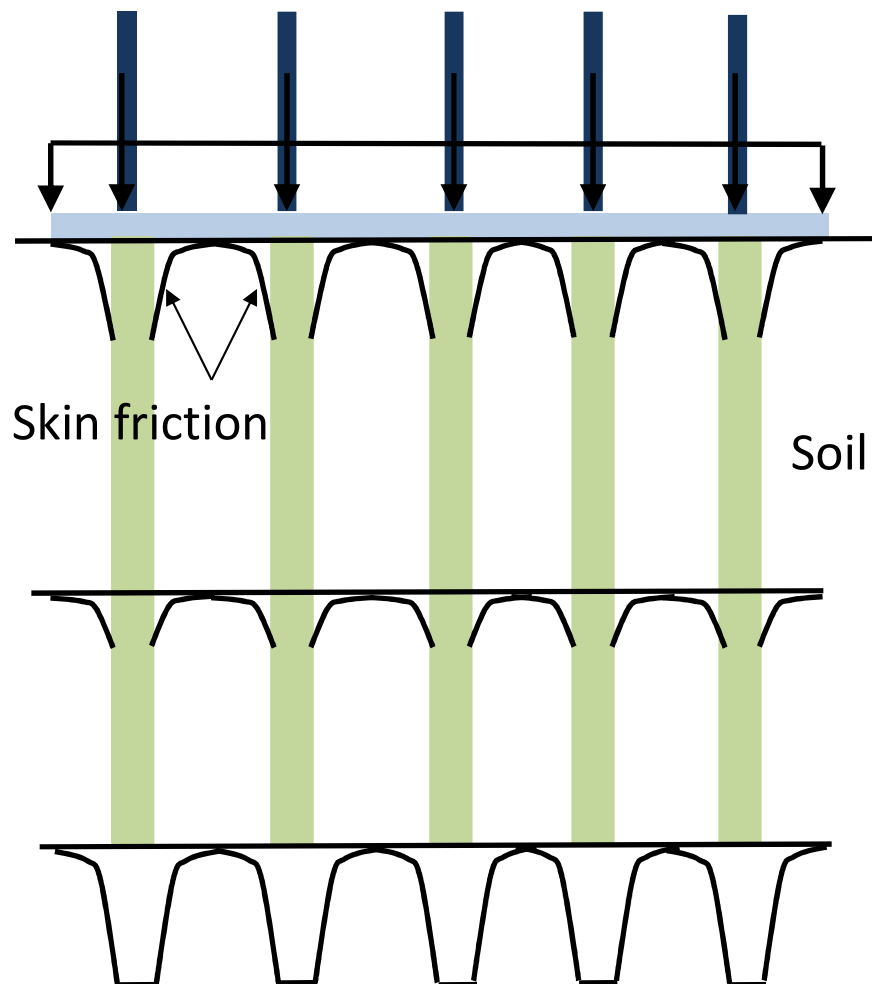
Reduction of absolute and differential settlements for a raft foundation: Piles = settlement reducers



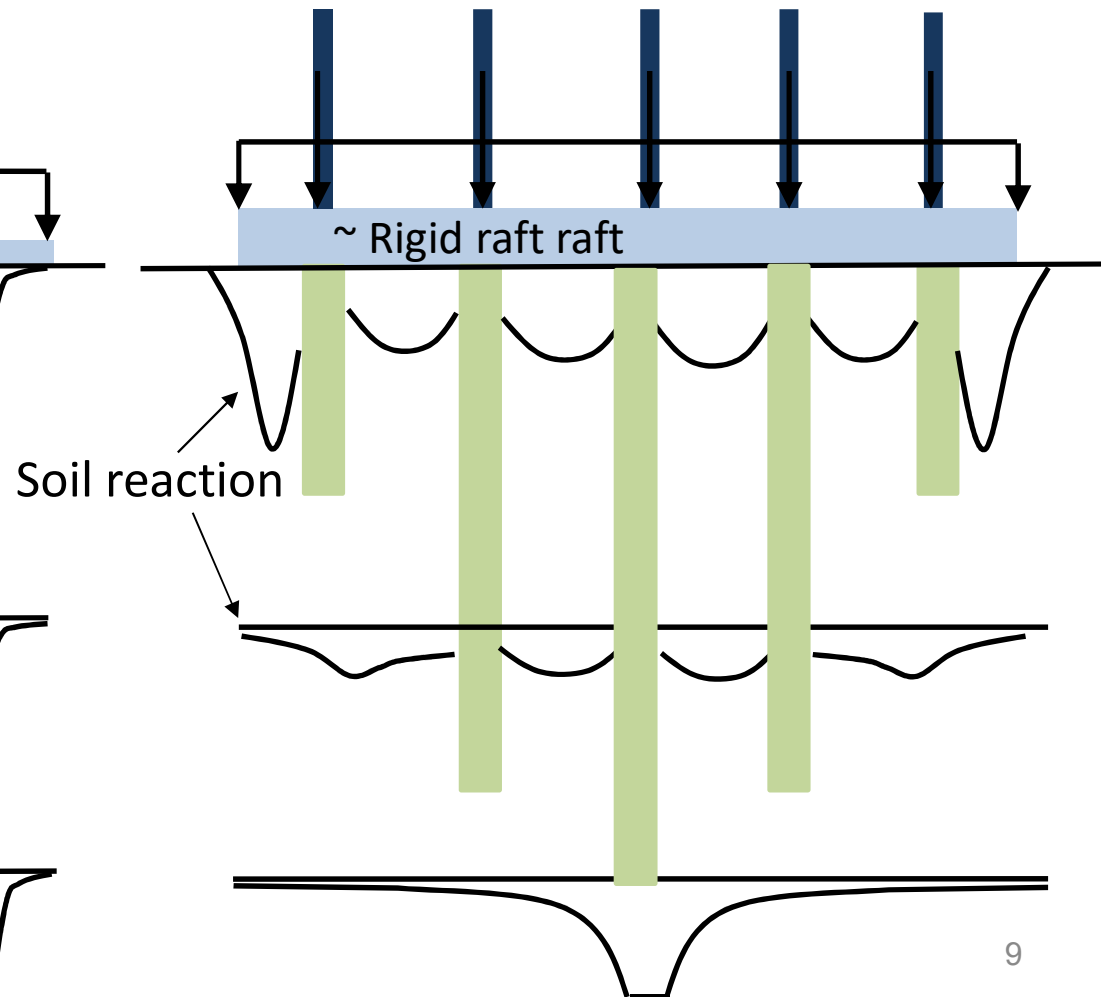
Bearing properties

Source: Richtlinie für den Entwurf, die Bemessung und den Bau von kombinierten Pfahl-Platten-Gründungen (KPP), R. Katzenbach et. al. (2000)

Pile foundation

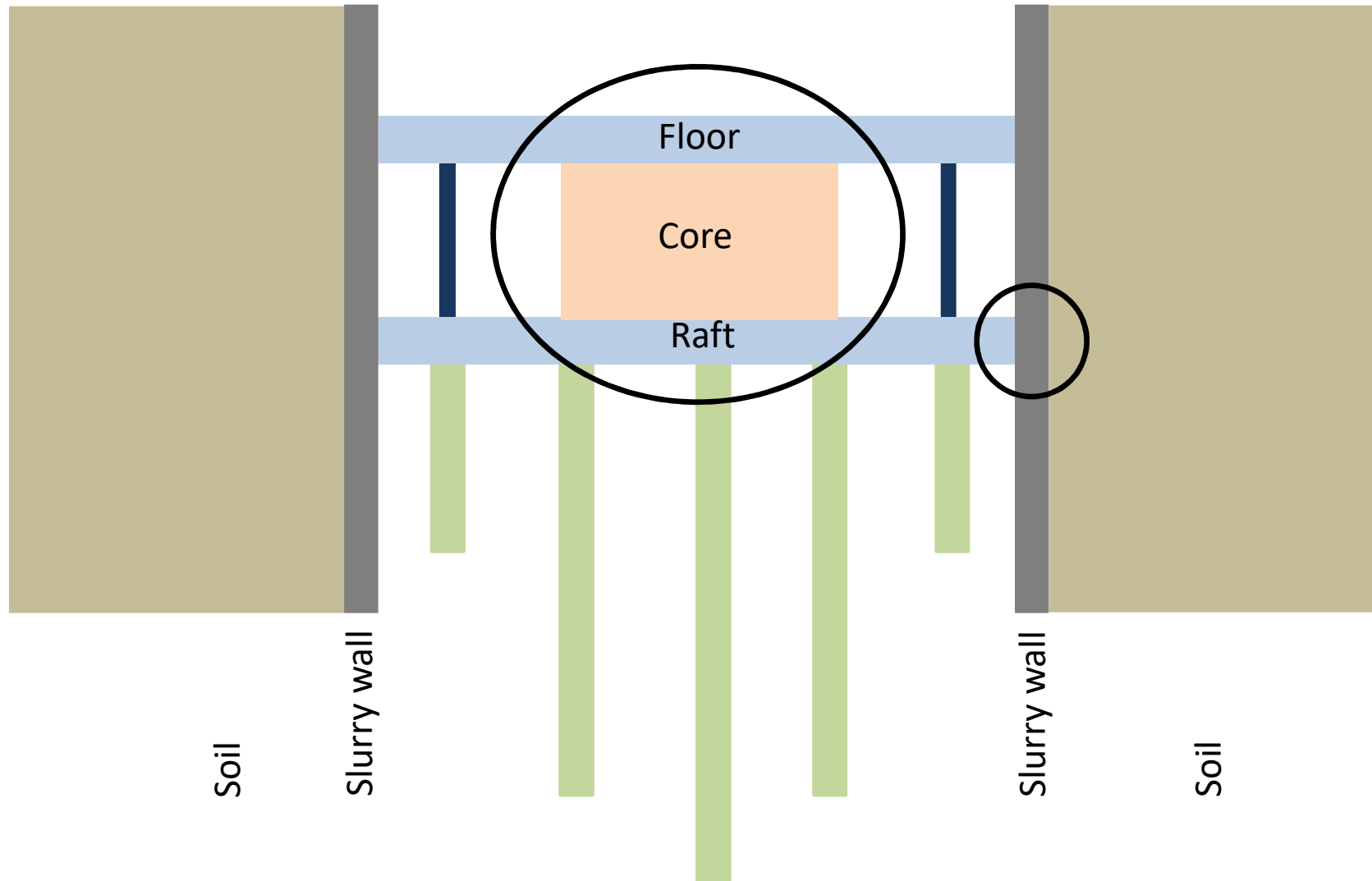


Pile Raft Foundation



Boundary conditions

Boundary conditions gives additional stiffness to the raft



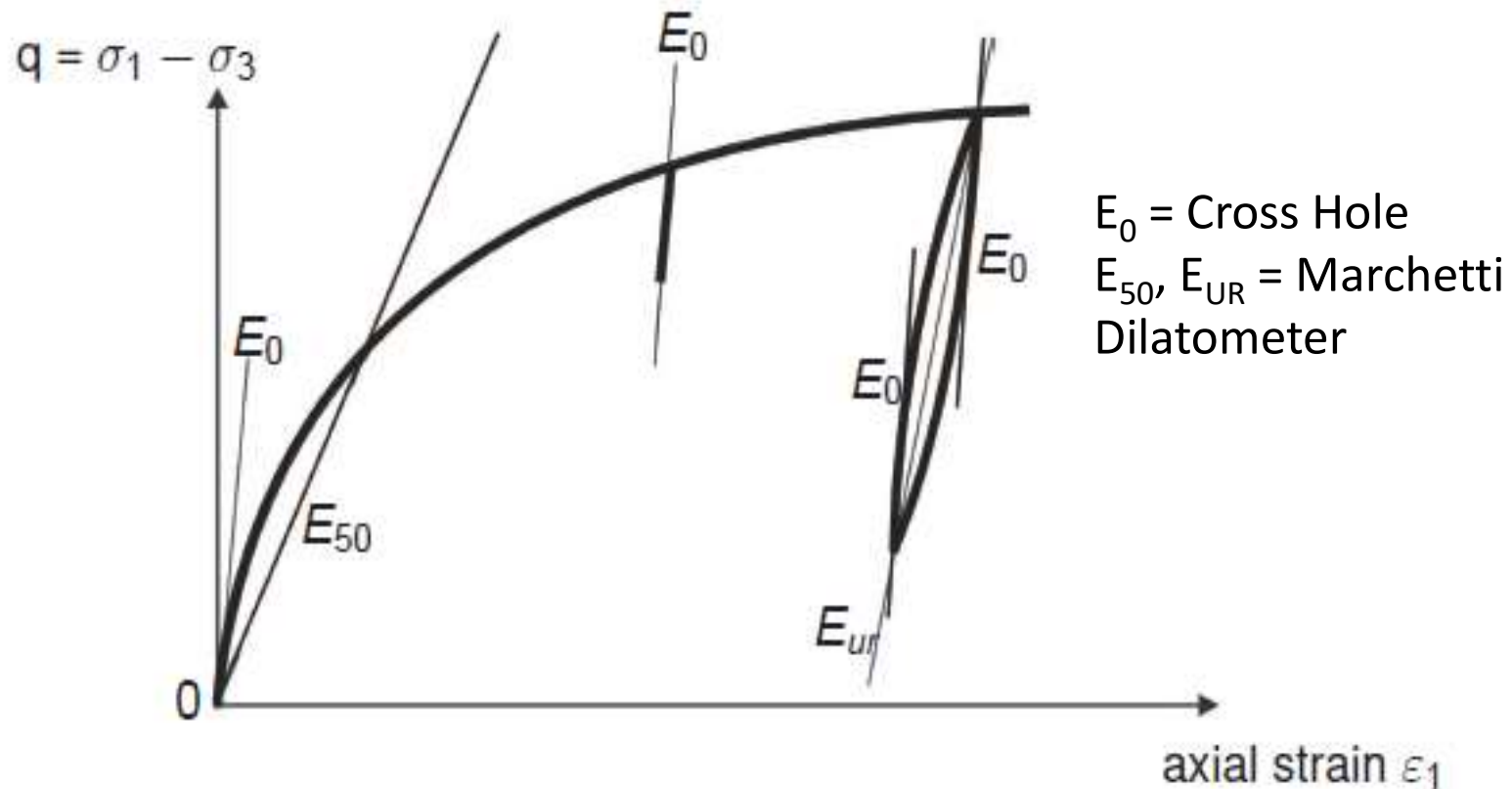


Soil modelling

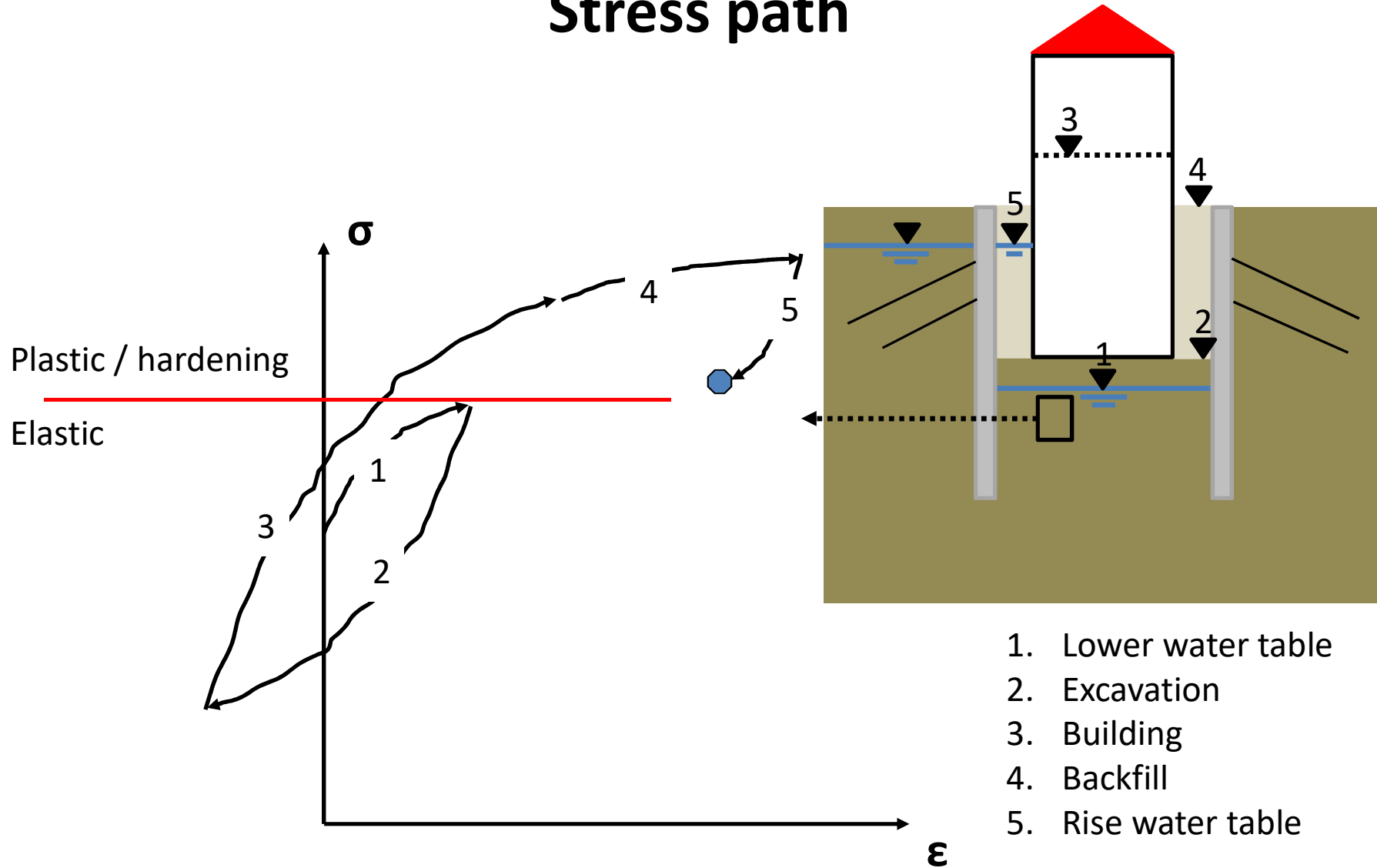
The image shows a 3D visualization of soil modeling. It features a central cluster of vertical foundation piles extending downwards into a complex, layered soil structure. The soil is represented by a mesh of blue and white polygons, showing various strata and voids. The piles are depicted as vertical cylinders with a textured surface. The overall scene is rendered in a blue-toned, semi-transparent style, highlighting the interaction between the piles and the surrounding soil mass.

Constitutive model: Hardening soil small

I: Stiffness unloading / Stiffness reloading

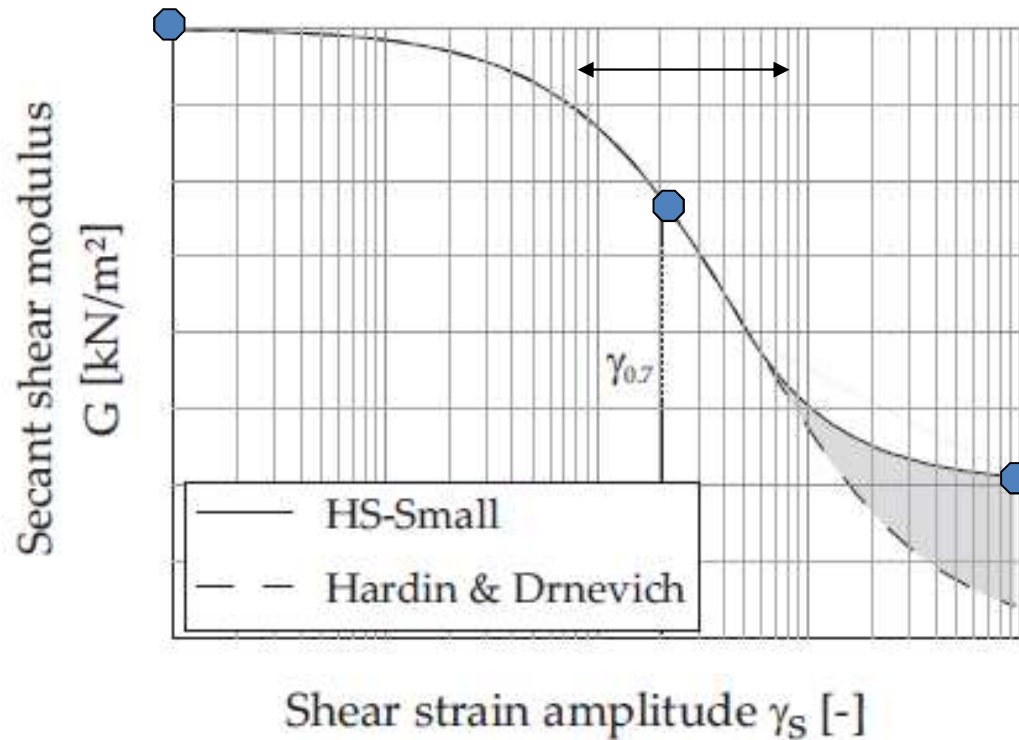


Stress path

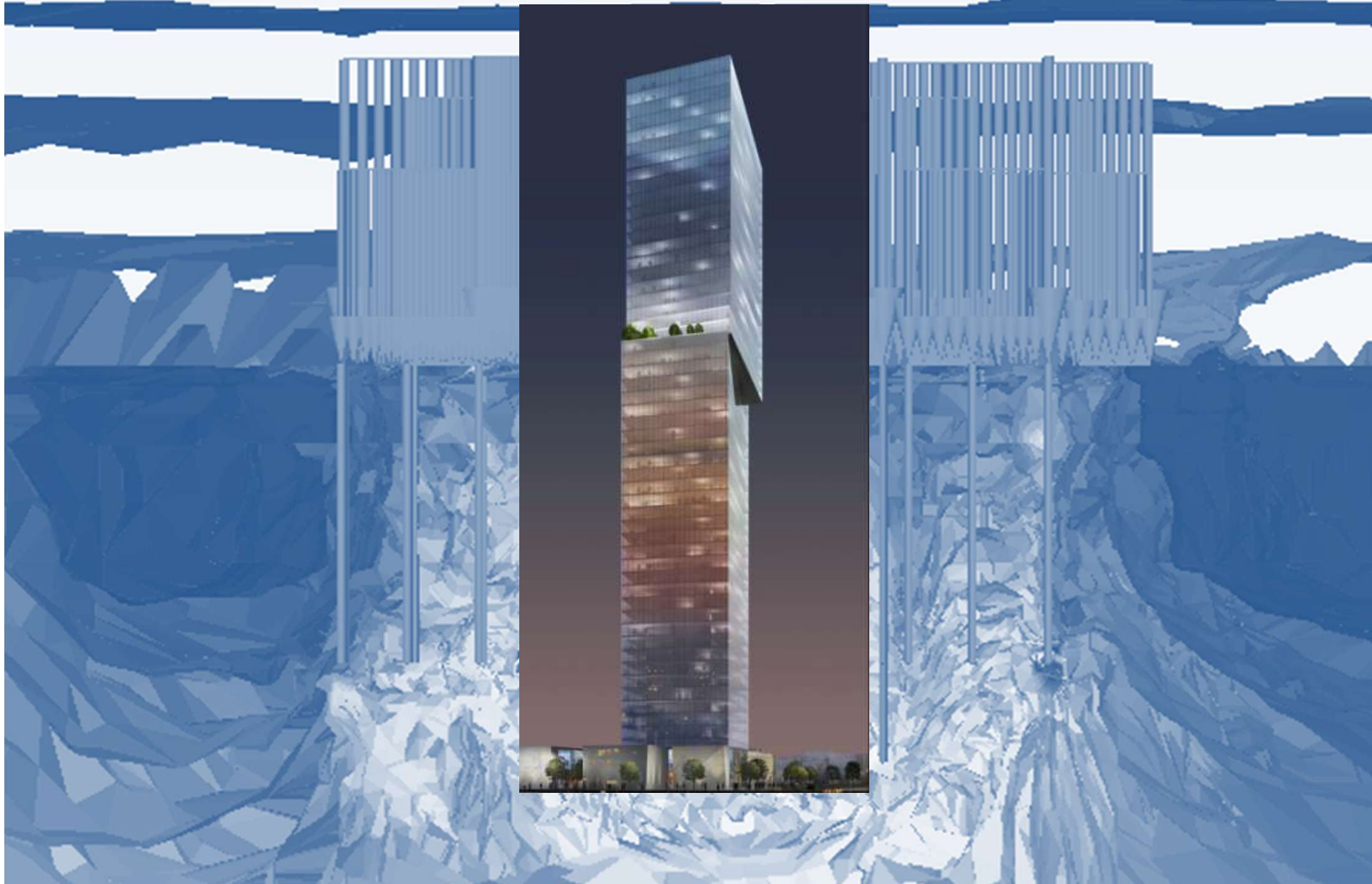


Constitutive model: Hardening soil small

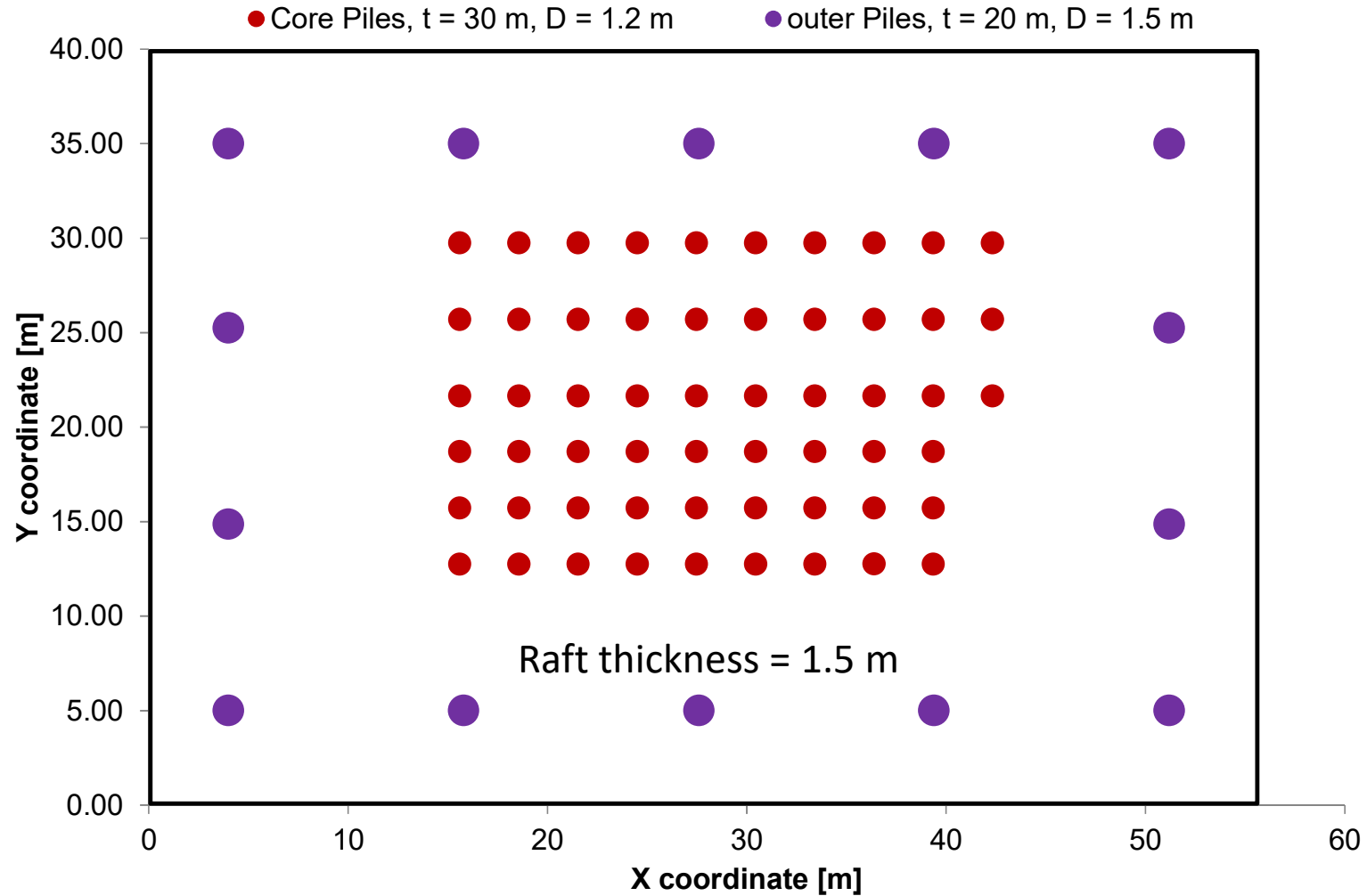
II: Small strain stiffness



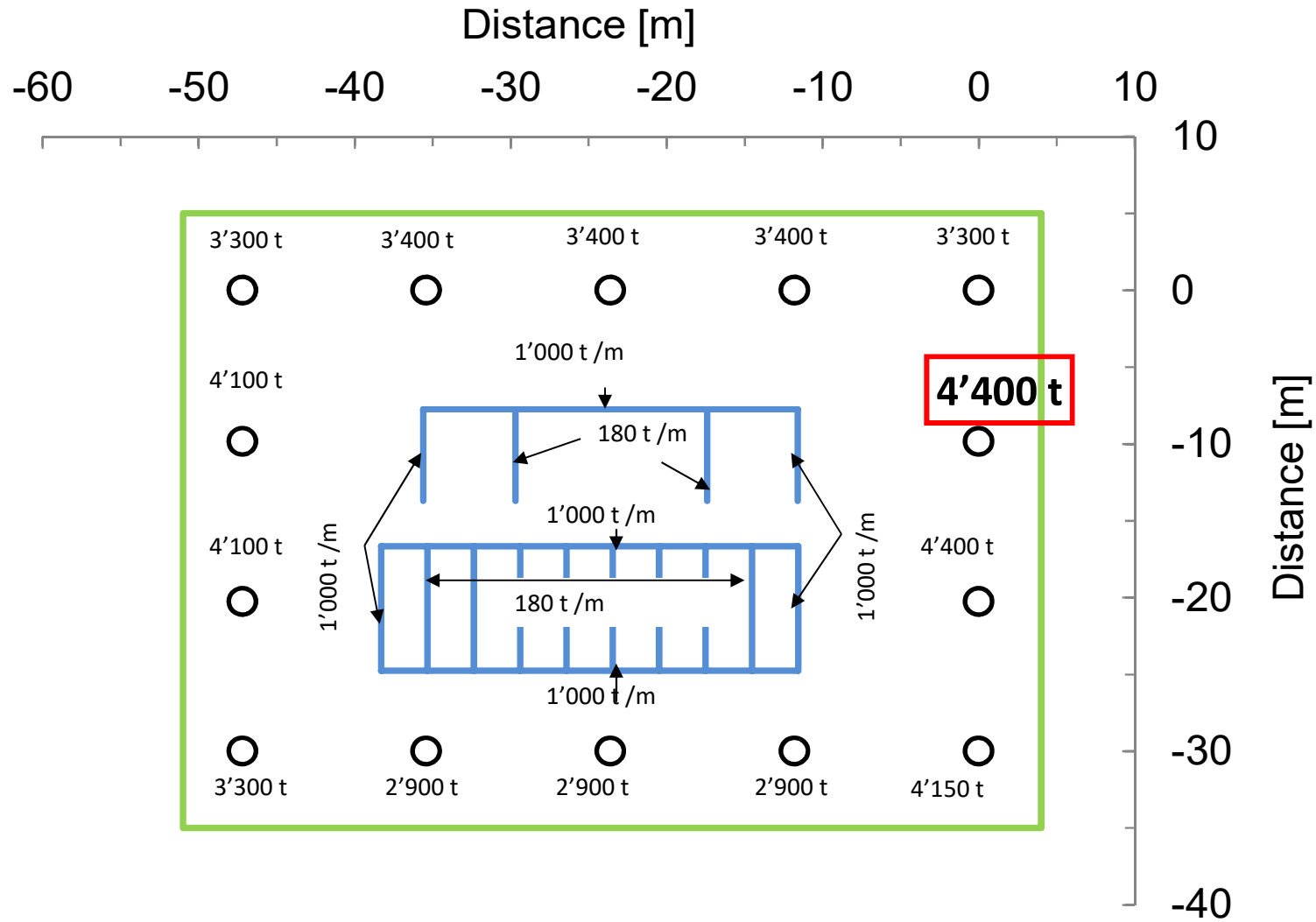
$$G_s = \frac{G_0}{1 + a\gamma / \gamma_{0.7}}$$



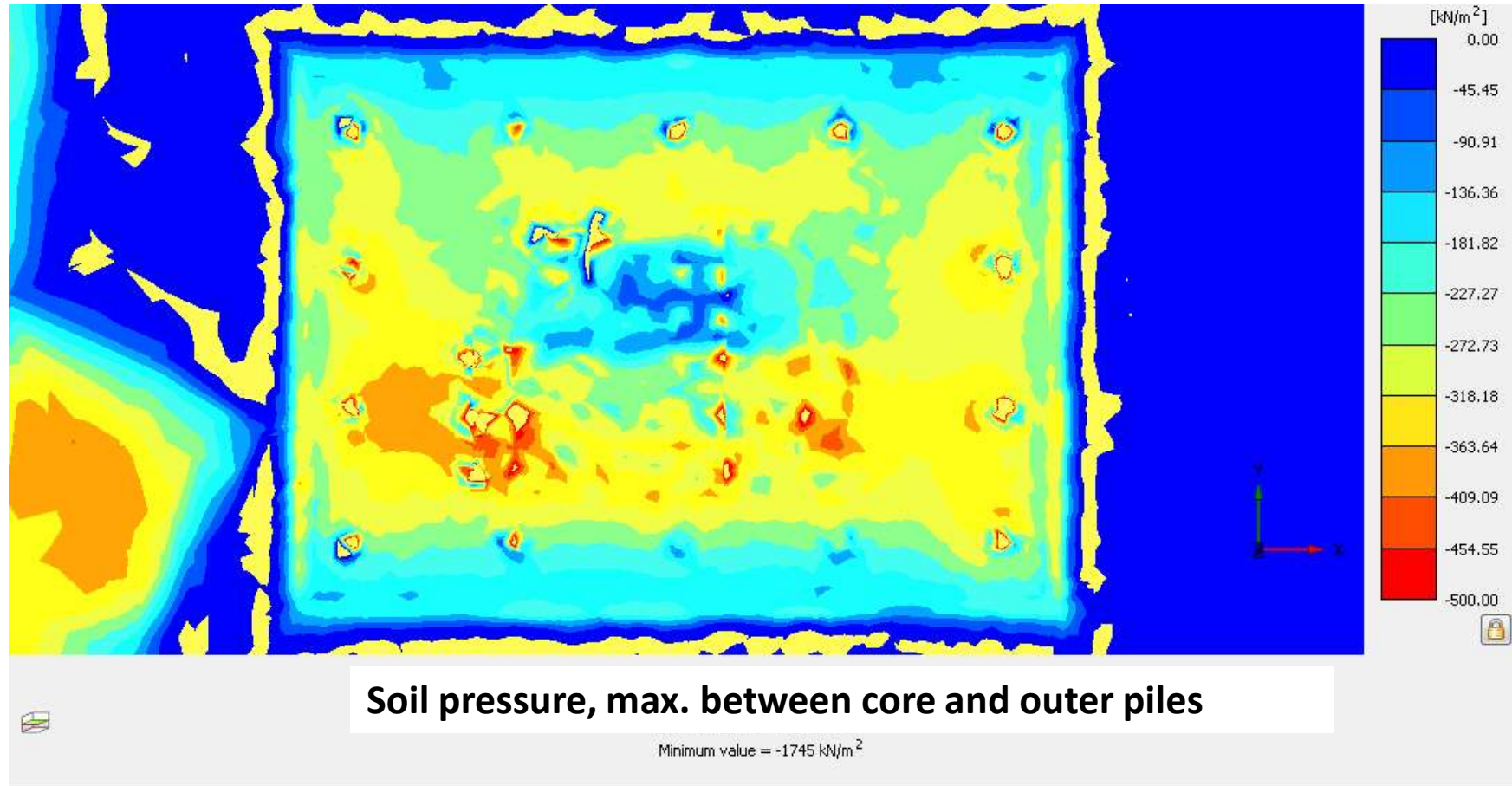
Foundation



Loads (tons)

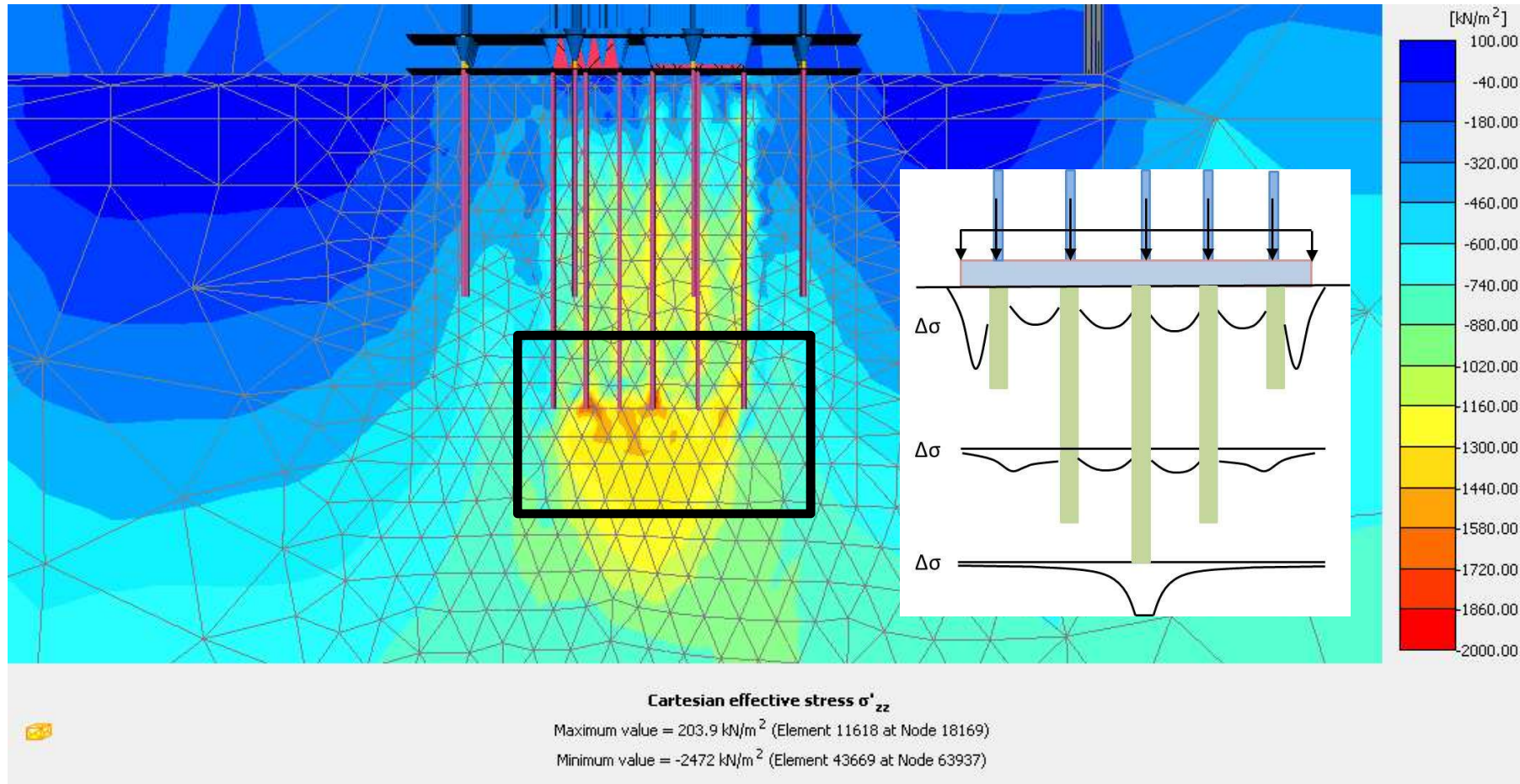


Raft contact pressure (pile raft foundation)

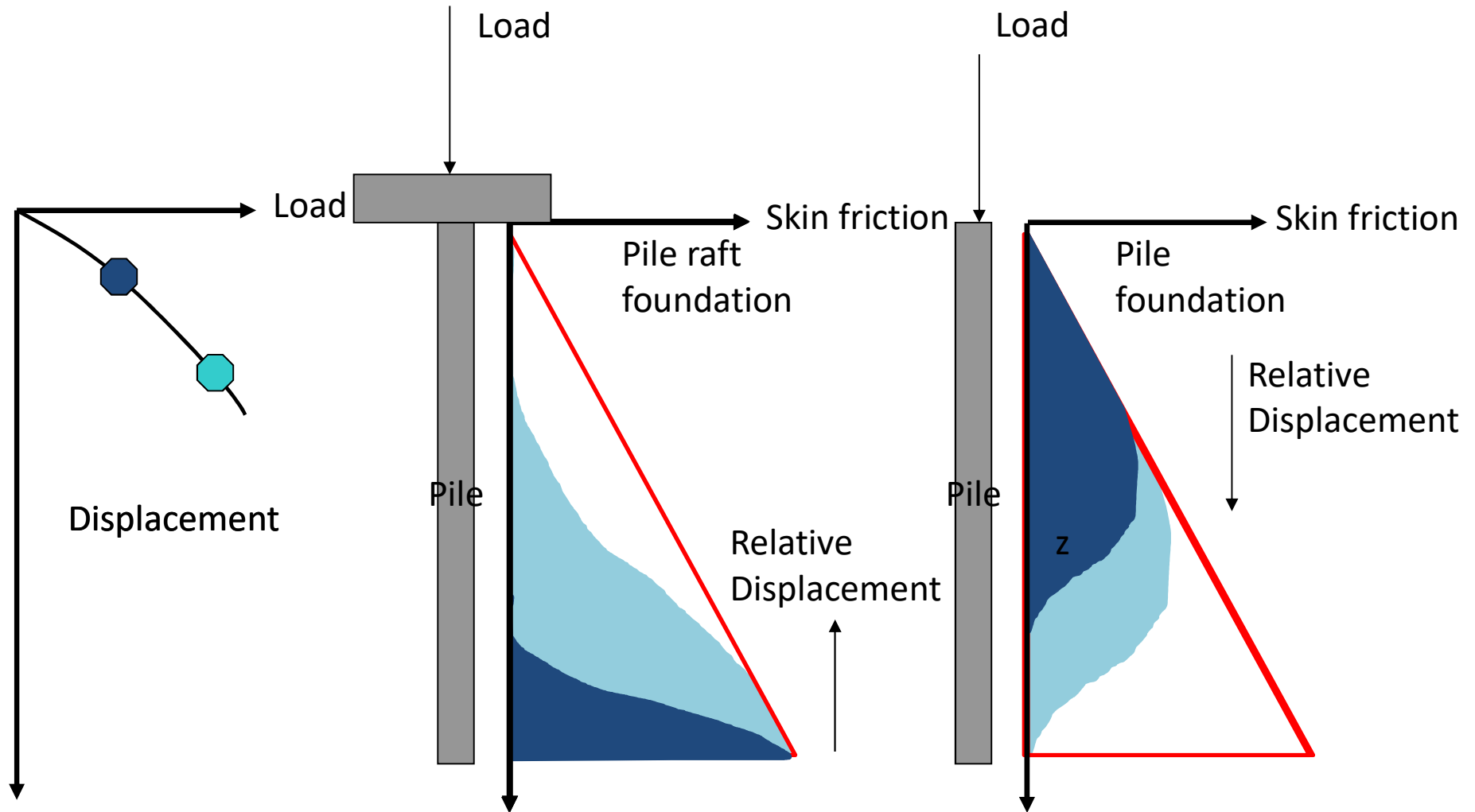


Maximum pressure = 3-5 kg / cm²

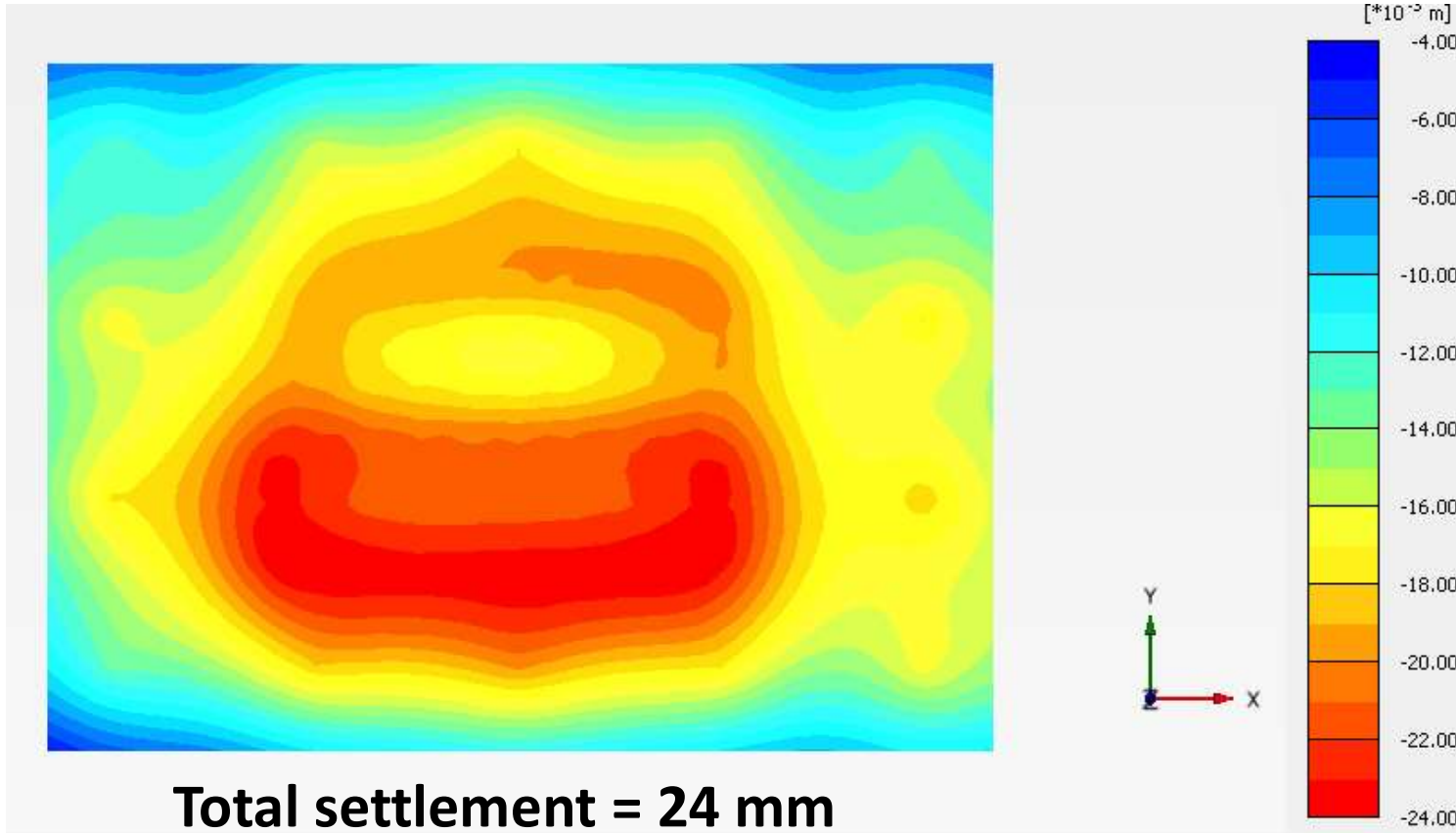
Equivalent Pile



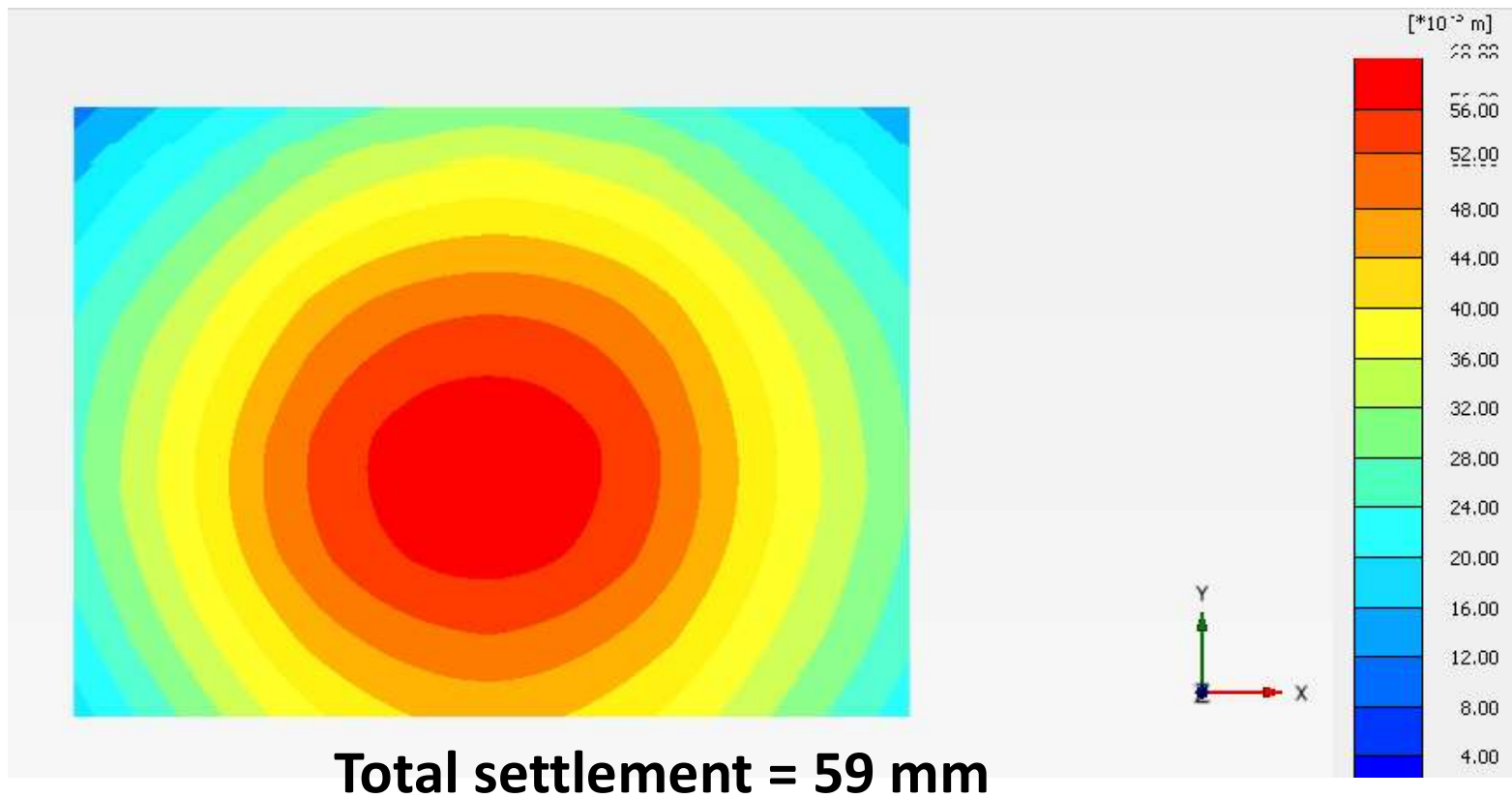
Pile friction PRF



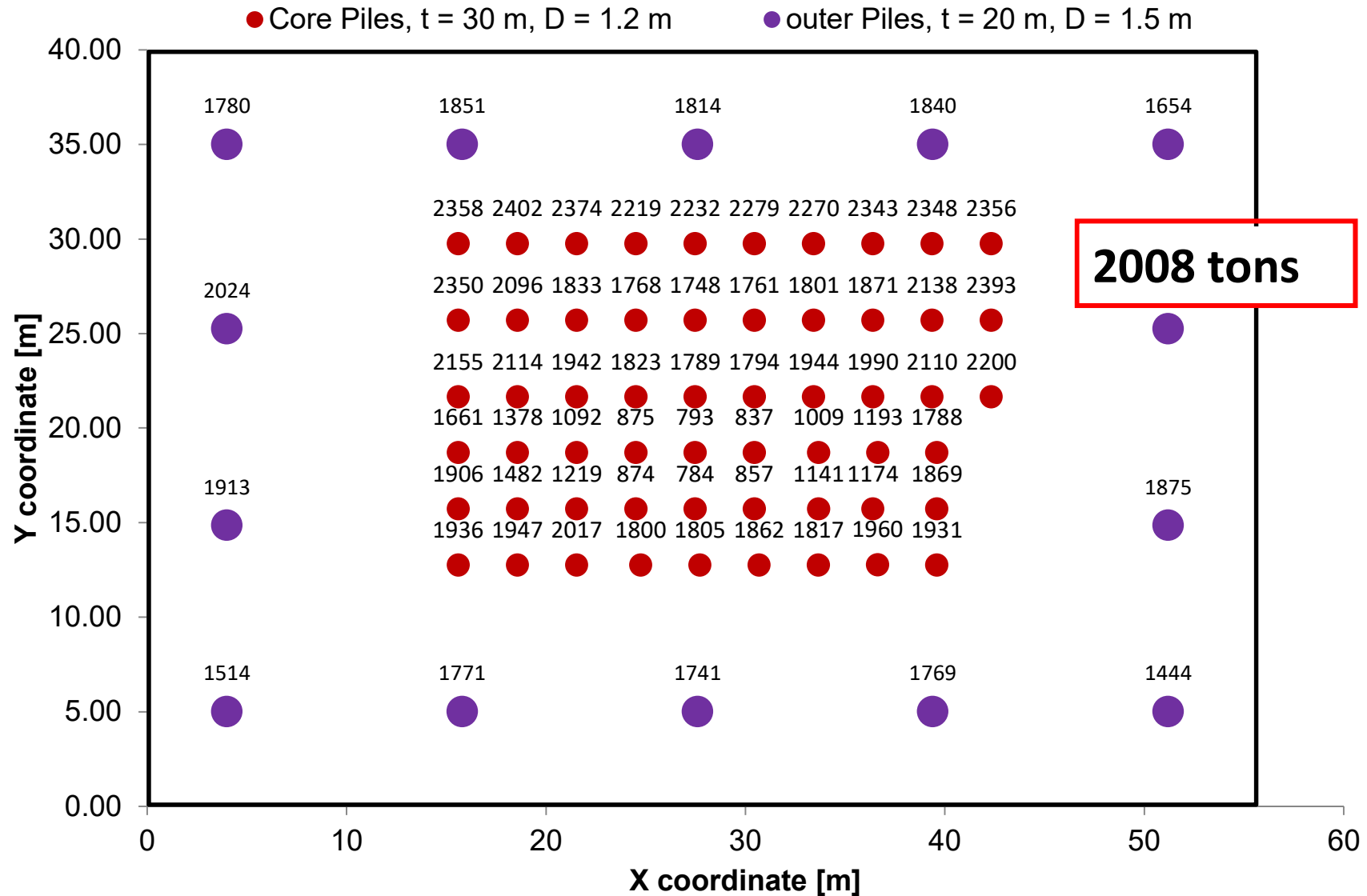
Total settlement pile raft foundation (raft 1.5 m)



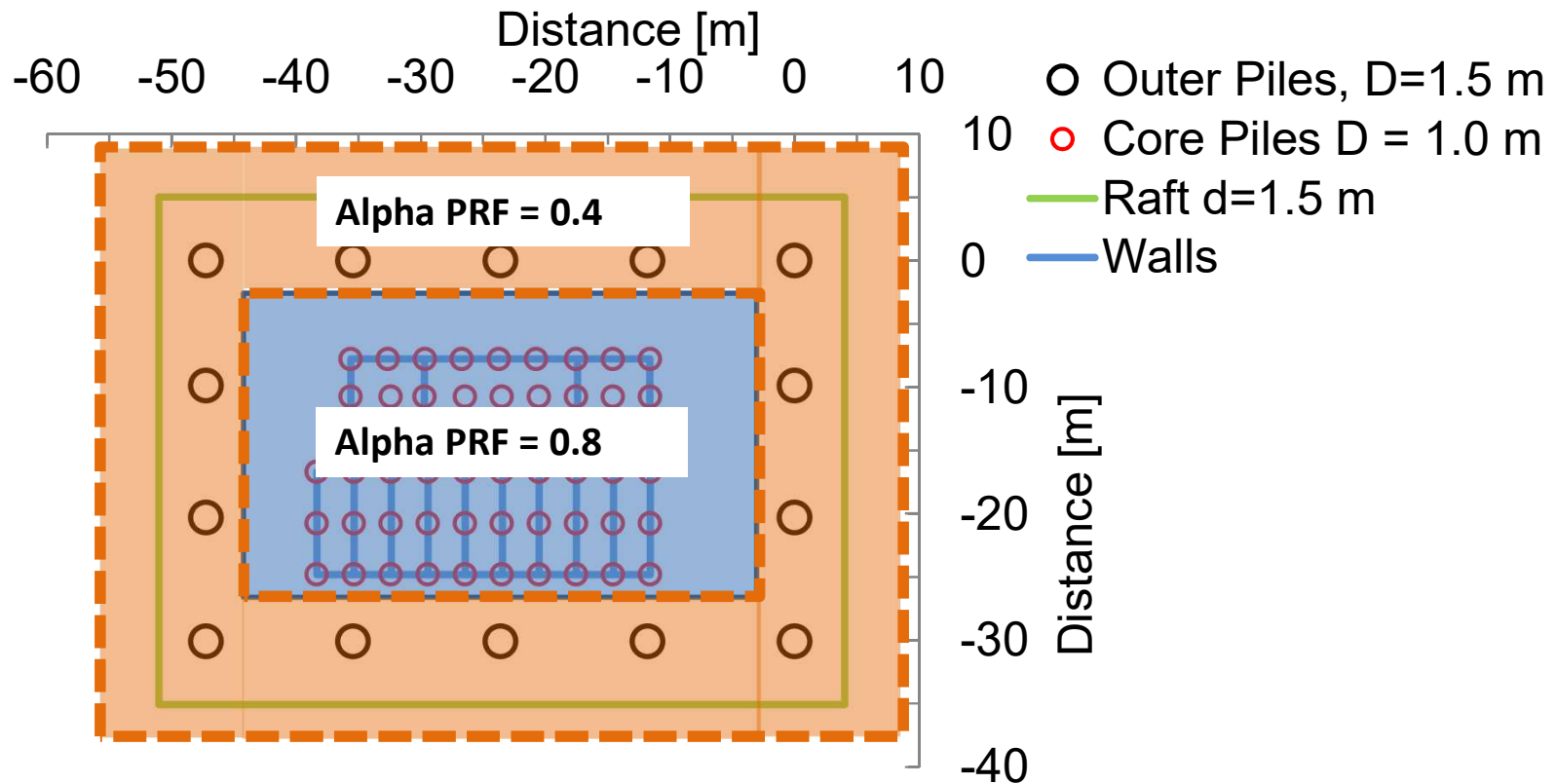
Total raft foundation settlement (3 m raft) No piles



Load carried by the piles (tons)



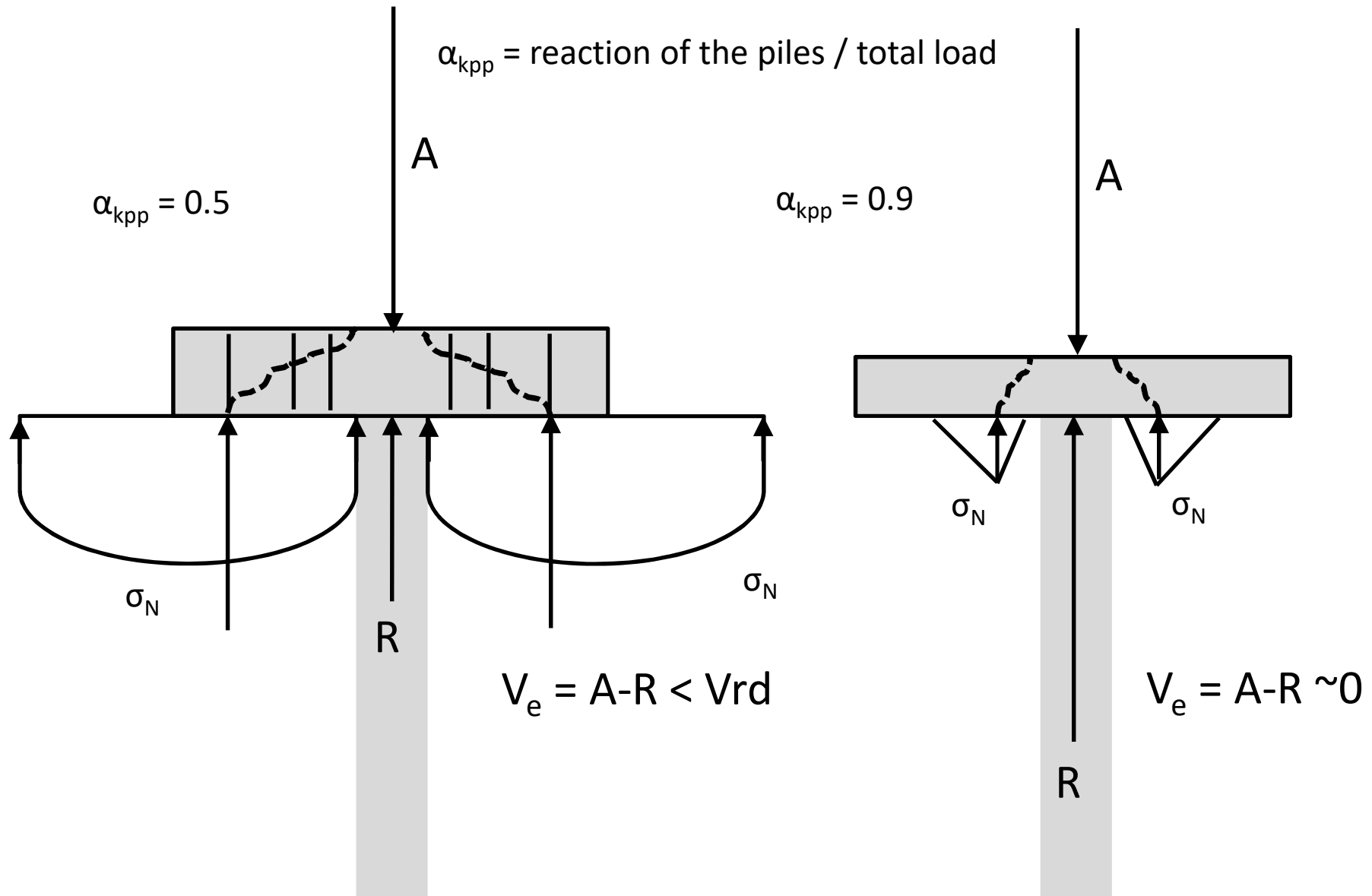
Alpha PRF = reaction of the piles / total load



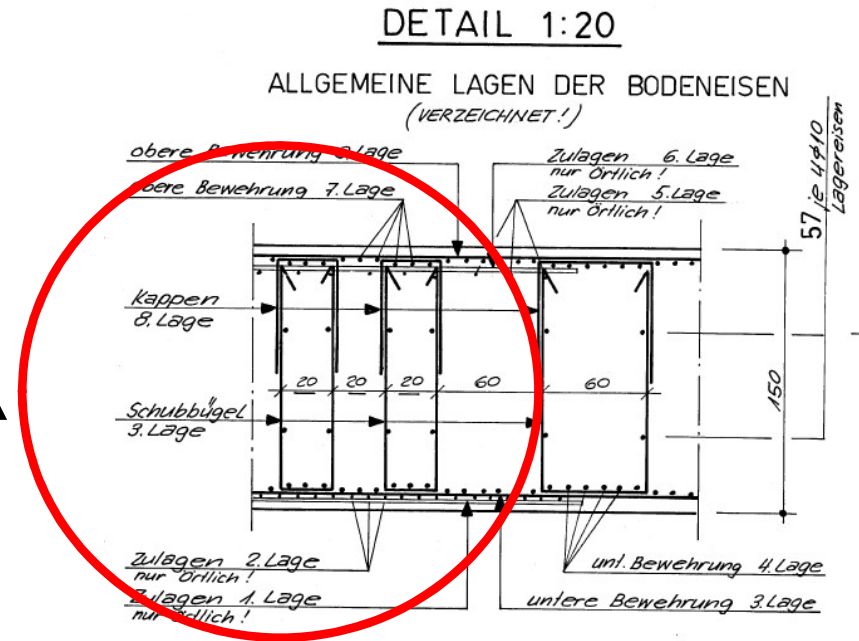
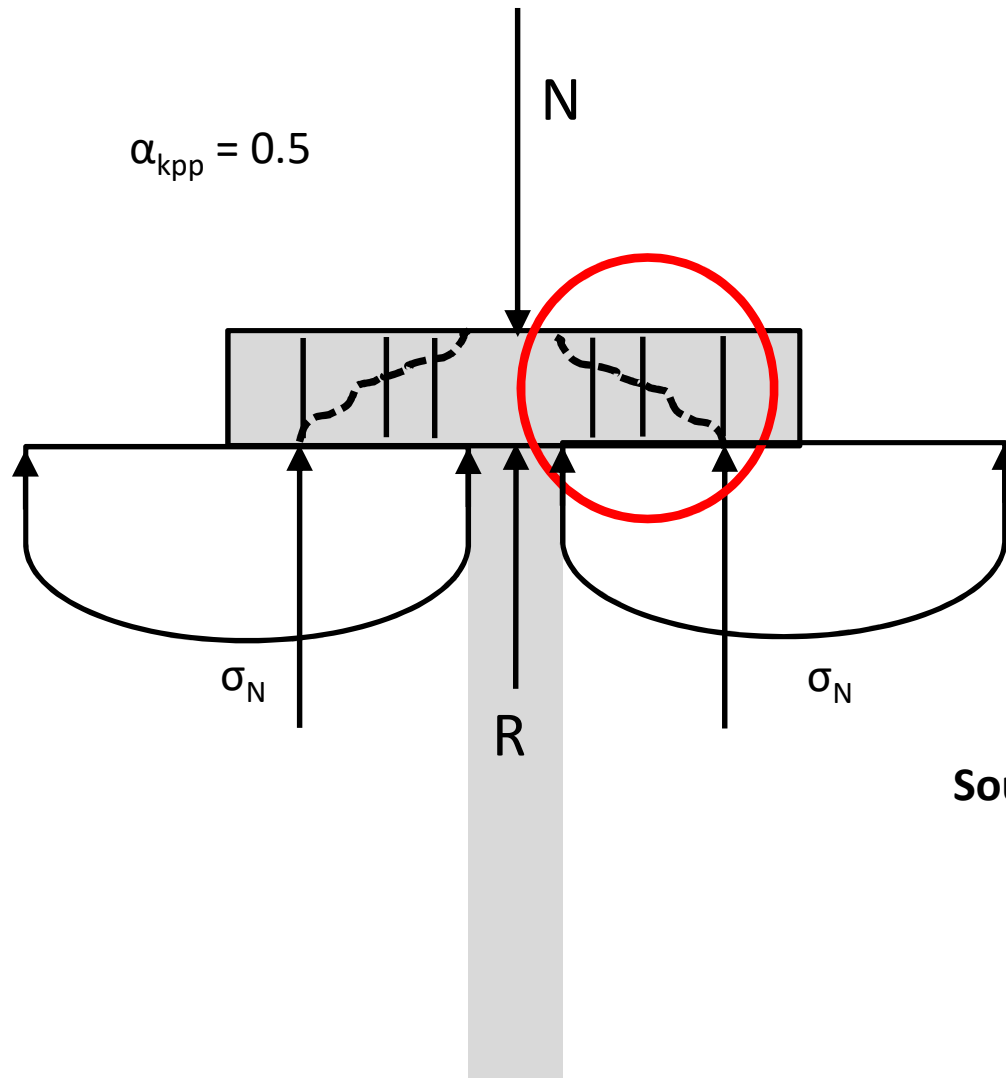


Design issues

Design issues: shear



Design issues: shear



Source Project: Basler & Hofmann AG, Zurich

Shear steel reinforcement

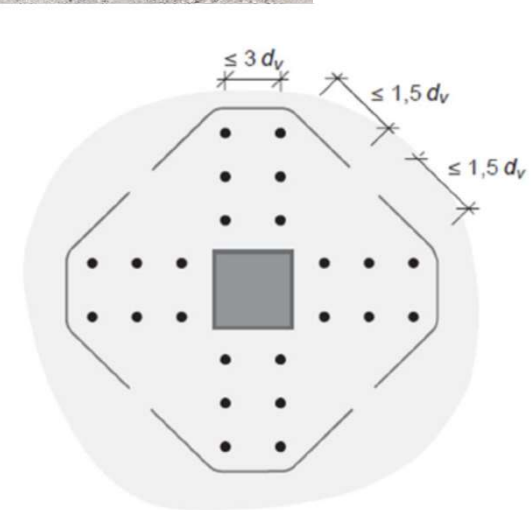


Raft

Pile head

Position for steel reinforcement

Source Project: Basler & Hofmann AG, Zurich



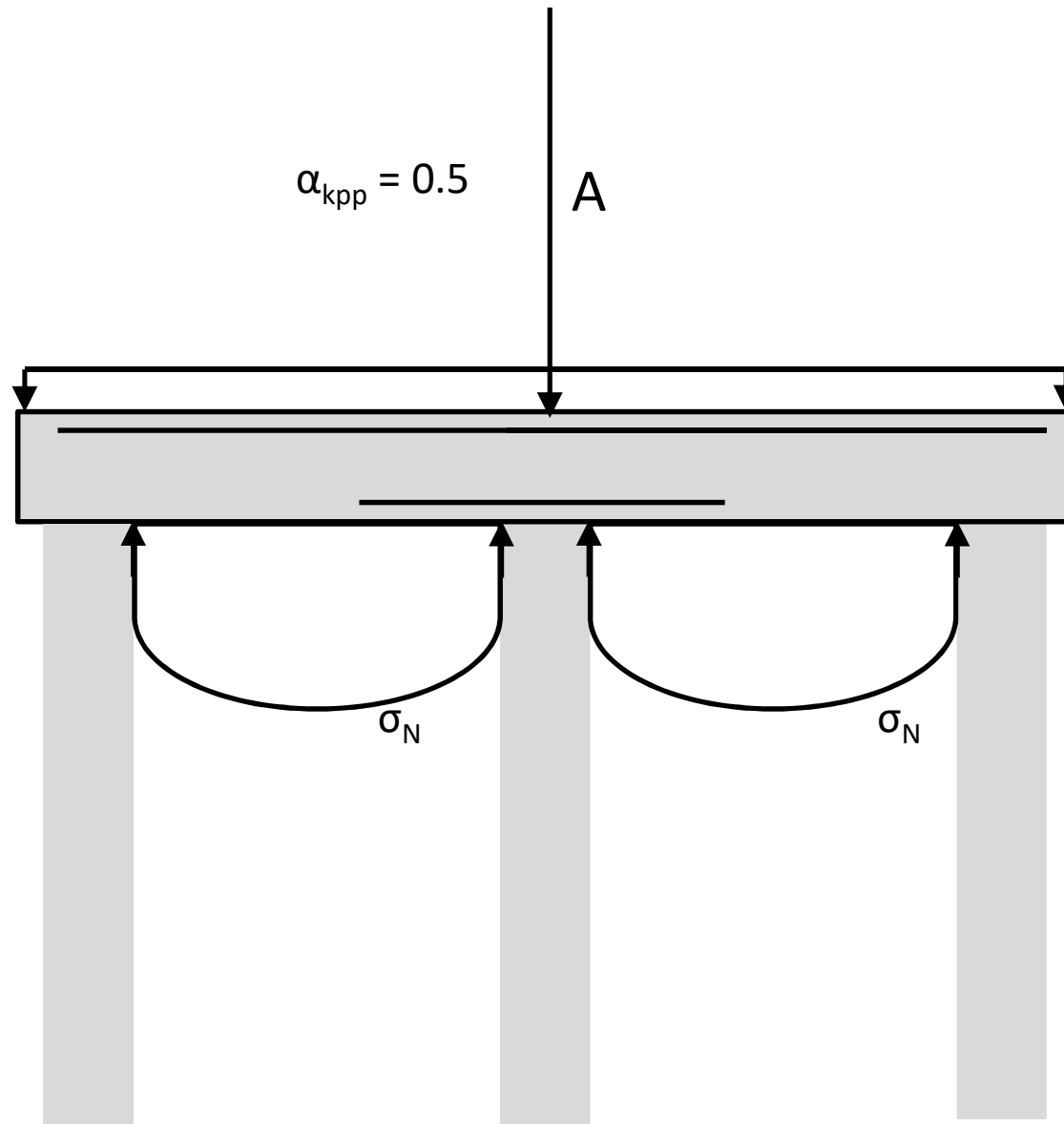
CH Standard: SIA 262



Source Project: Basler & Hofmann AG, Zurich

The 8th National Congress of the Israeli Society of Civil, Structural and Infra-structural Engineers, 9 – 12.11.2013, Tel Aviv

Design issues: bending



Design issues: bending



Steel plate for centering for precasted Columns

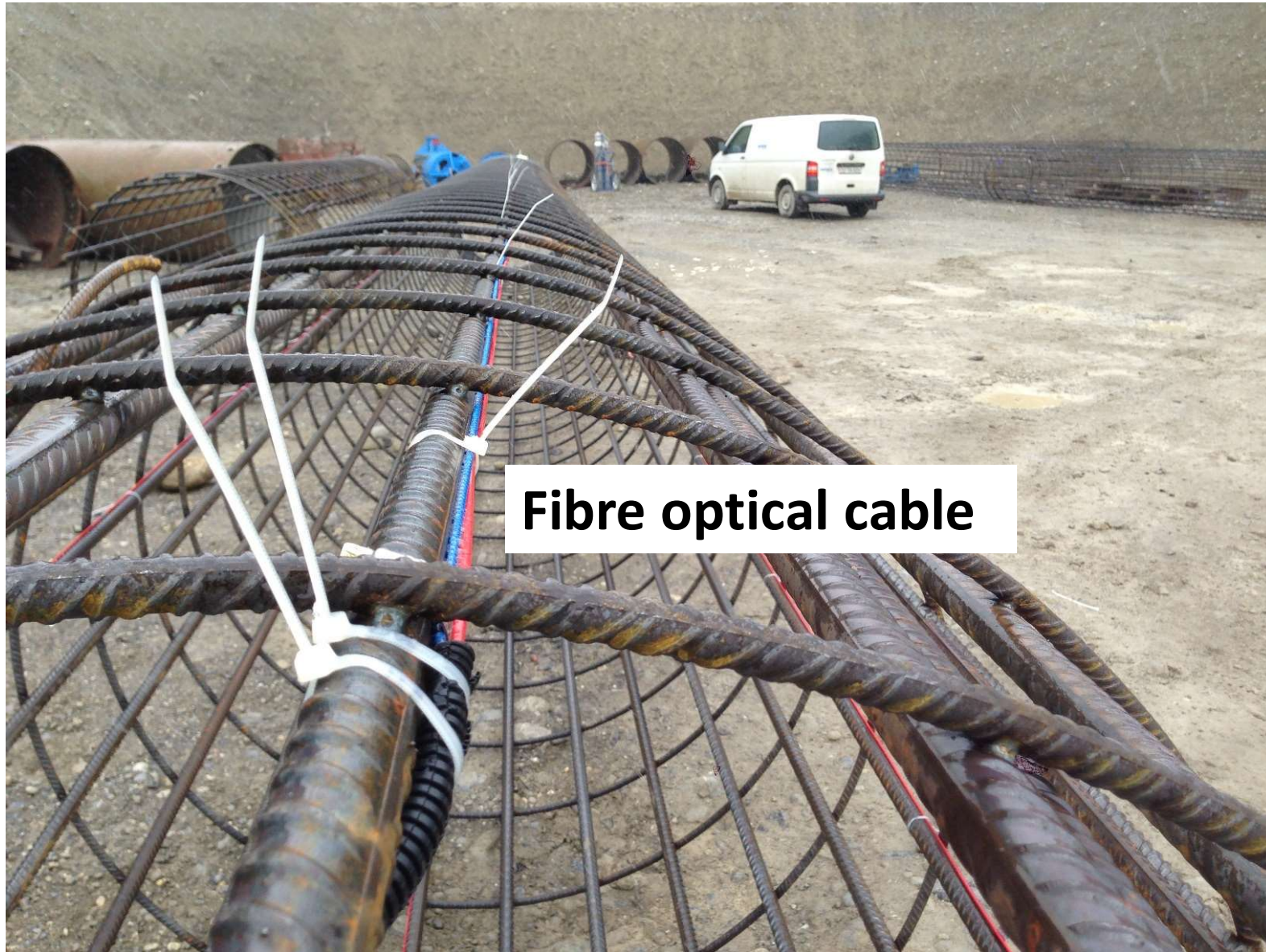
Source Project: Basler & Hofmann AG, Zurich

The 8th National Congress of the Israeli Society of Civil, Structural and Infra-structural Engineers, 9 – 12.11.2013, Tel Aviv



Observational method

Measuring piles! (Pilescan)



Fibre optical cable

Source Project: Basler & Hofmann AG, Zurich

The 8th National Congress of the Israeli Society of Civil, Structural and Infra-structural Engineers, 9 – 12.11.2013, Tel Aviv

Measuring loads!

**Load cells
below the
columns**

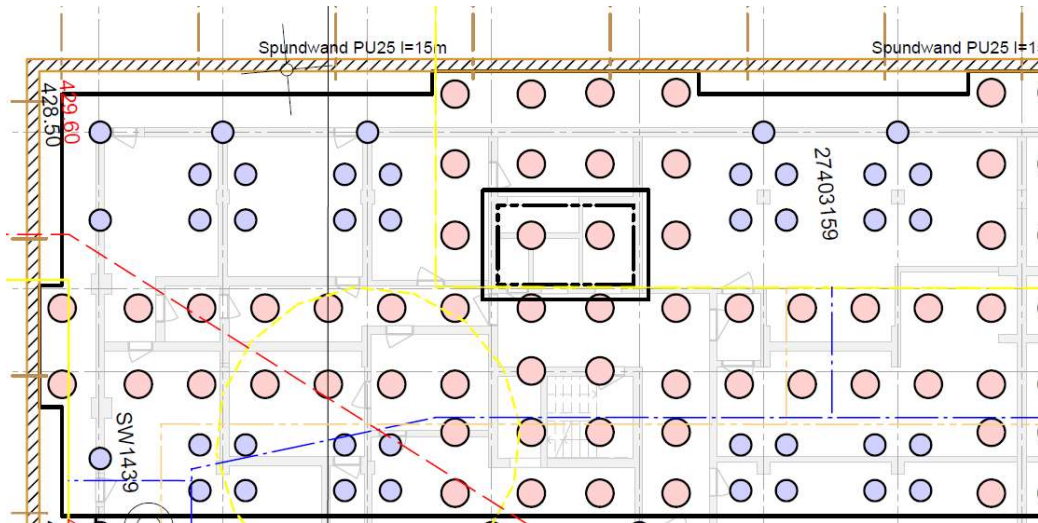


Source Project: Basler & Hofmann AG, Zurich

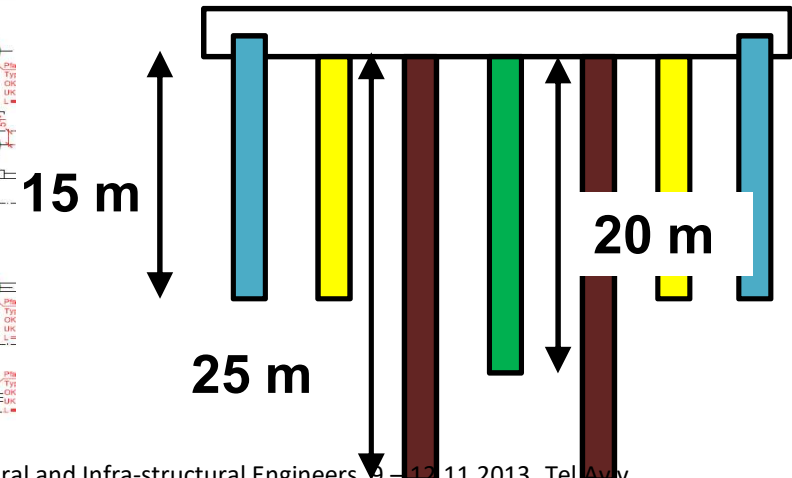
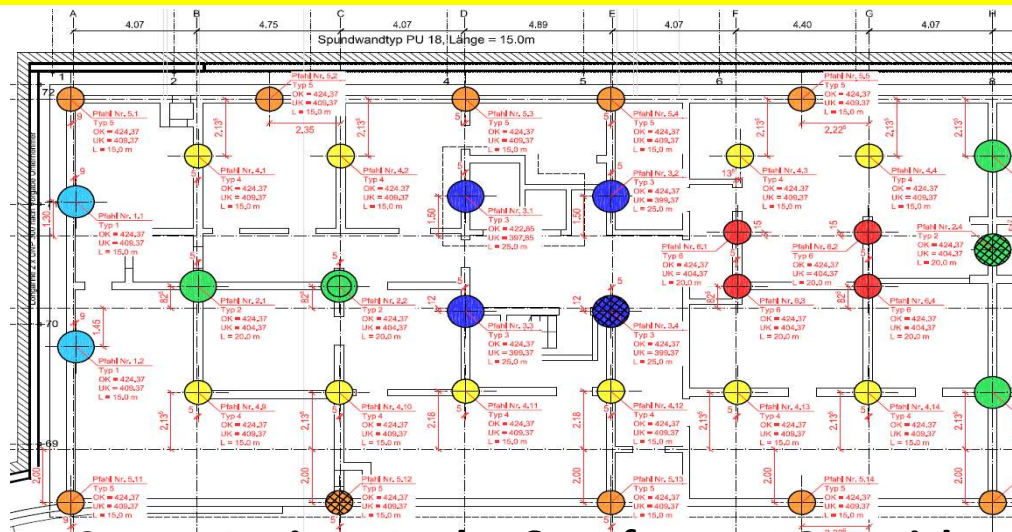
The 8th National Congress of the Israeli Society of Civil, Structural and Infra-structural Engineers, 9 – 12.11.2013, Tel Aviv



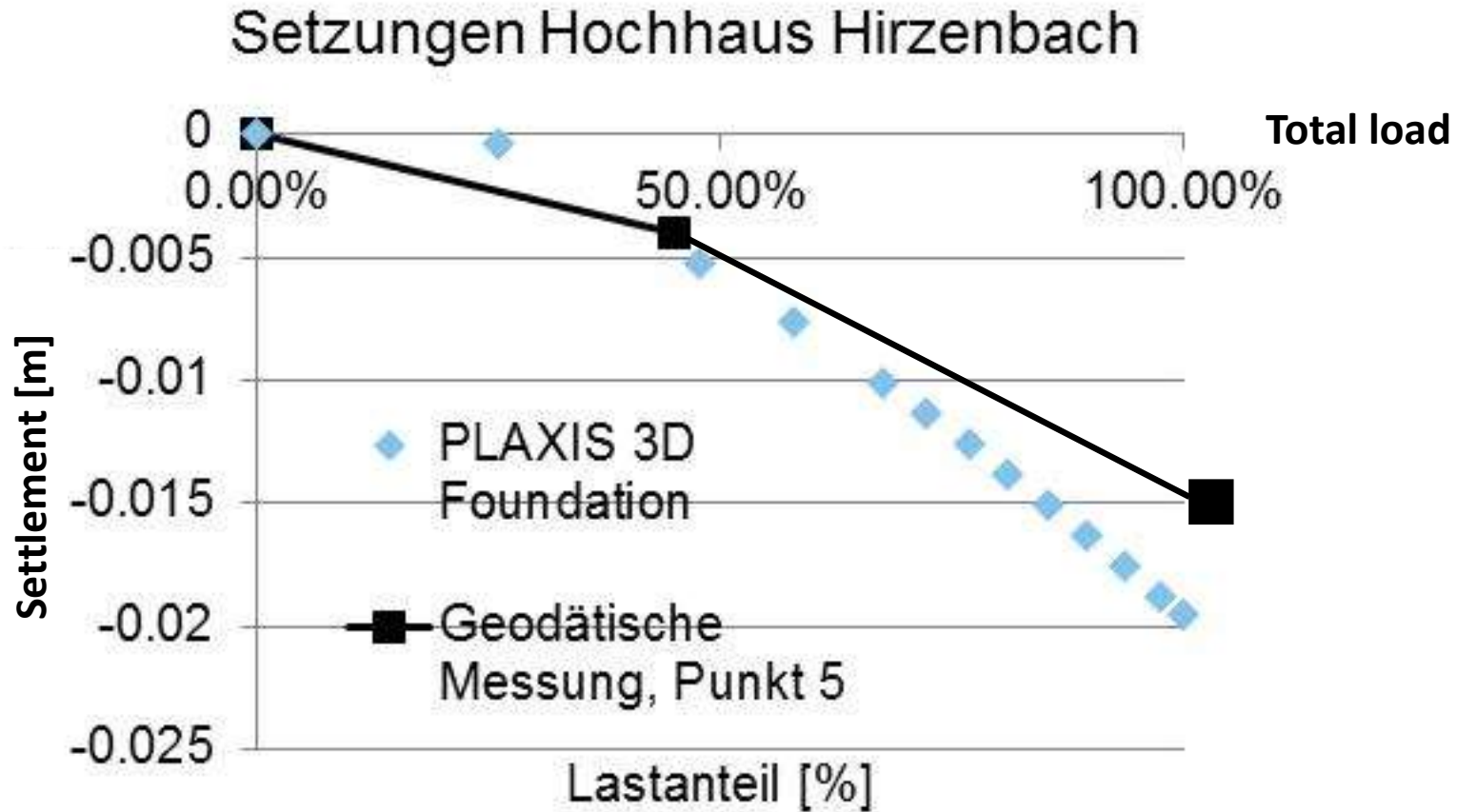
CH Example



Pile raft instead of pile foundation: 50 % less piles



Source Project: Basler & Hofmann AG, Zurich



Source Project: Basler & Hofmann AG, Zurich

The 8th National Congress of the Israeli Society of Civil, Structural and Infra-structural Engineers, 9 – 12.11.2013, Tel Aviv



Conclusions

General Conclusions

1. PLAXIS allow modelling the behaviour of Pile raft foundation precisely
2. PLAXIS takes into account the real soil behaviour: the load history is important for settlement
3. Pile raft foundation is a mix of rigid raft and pile foundation

Conclusions Midtown Project

4. Settlement in Electra reduced by 2 – 3 times compared to raft foundation

5. Raft thickness required by punching reduced by the half (3 to 1.5 m)

6. Observational method should be adopted

Ishay David

Dr. Carlo Rabaiotti

**Thank you and
questions?**

