

Concept for a reference pile testing site for the development and improvement of NDT-CE

Conception d'un champ de tests de référence des piliers de fondations pour le développement et l'amélioration du NDT-CE

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Idea and Intention

Nondestructive methods for pile testing are well known for several decades. They are used for determining shape and condition of foundations as a quality control tool. There is a large variety of methods, standards and procedures in Europe and all over the world.

A German working group with participants from research and industry is going to develop sites for nondestructive testing of piles and foundation slabs.

Such sites are needed for:

- Research and development
- Equipment test
- Education of test personal
- Validation purposes

NDT Methods

The following NDT methods are taken into account for the test sites:



Dynamic pile integrity test

from surface:

- Static Load Test (load capacity)
- Dynamic Load Test (load capacity)
- Dynamic Pile Test (load capacity)
- Dynamic Pile Integrity Test (length, larger defects)
- Radar (geometry, voids)
- Ultrasonics (geometry, cracks, delaminations)
- Impact Echo (geometry, cracks, delaminations)

in/from boreholes in the piles:

- Sonic logging/tomography (defects)

in/from boreholes aside piles:

- Borehole radar (form)
- Parallel-Seismic method (length)
- Seismic/geoelectric tomography (soil properties)

with implemented sensors:

- Deformation measurement in sections
- Integrity testing, detection of cracks and voids (investigation and spatial allocation of defects)

Partners

The test sites are developed in close cooperation between partners from research, contraction industry, equipment manufacturers, service providers and consultants:

- Franki Grundbau
- Geoforschungszentrum Potsdam
- Grundbaulabor Bremen
- Hochtief Construction AG
- IBB Ingenieurbüro Giertz, Emden
- University of Braunschweig, IGB



The construction of the slab is financed by and used for the EC funded 5th framework project RUFUS (re-use of foundations for urban sites, www.webforum.com/rufus).



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Location

BAM site Horstwalde

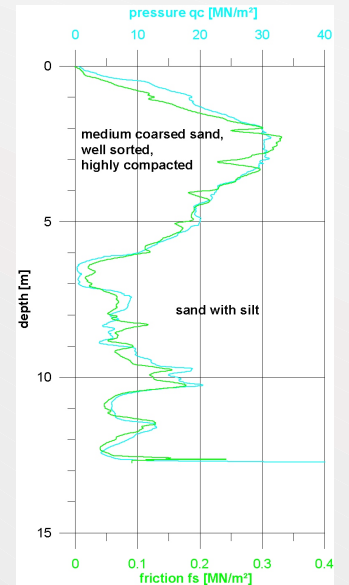


Site

The BAM site at Horstwalde (60 km south of Berlin) is a former military training ground now used mainly for tests on containment safety and explosives.

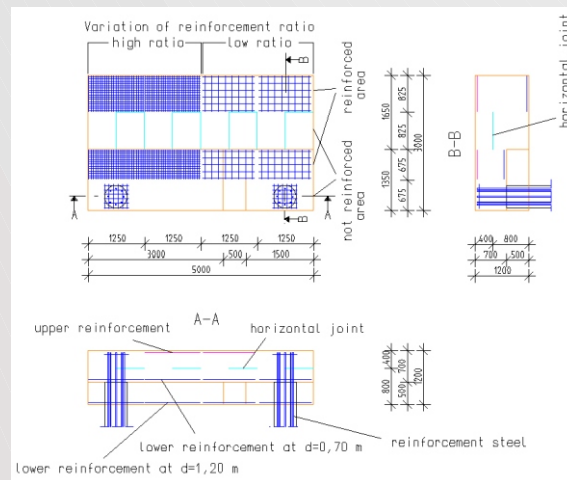
Subsoil

Geophysical investigations and shallow boreholes showed mainly medium coarsed sand. The groundwater table is about 3 m below surface. CPT tests showed very stiff soil between 2 and 6 m depth and a certain amount of silt in depths greater than 7 m. Thus Horstwalde is suitable for shallow foundations and bored piles. For driven or displacement piles another site will be found.

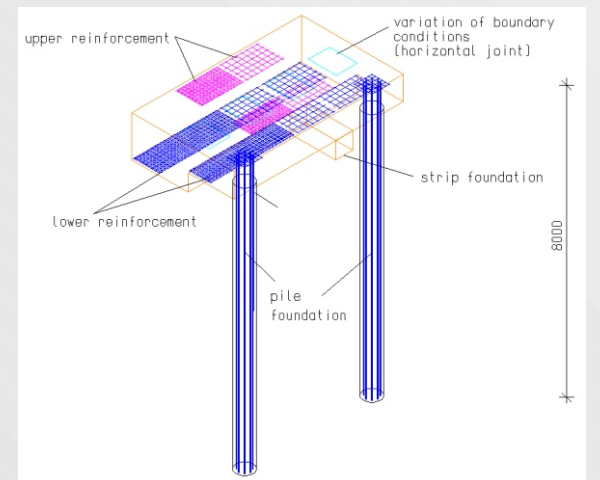


CPT results at Horstwalde

Design



Above: Design for foundation test slab (raft and pile). Below: Design for displacement pile test site.



The design phase of the test site(s) is finished. The layout of piles and other objects provides large amount of different test arrangements.

Features:

- Slab with varying thickness, reinforcement ratio and varying bounding condition at a horizontal joint
- Strip and pile foundation beneath slab
- Piles (Atlas and Franki type), sound and with faults at different depths, partially instrumented

References

ASTM: Standard Test Method for Low Strain Integrity Testing of Piles. ASTM D5882-00.

Finno, R.J. (1997): Non-Destructive Evaluation of a Deep Foundation Test Section at the Northwestern University National Geotechnical Experimentation Site. <http://www.itn.northwestern.edu/projects/found/df.html>.

German Society for Geotechniques DGGT (1998). Recommendations for Static and Dynamic Pile Tests; Institut für Grundbau und Bodenmechanik, Technische Universität Braunschweig

Geo Council: NGES The National geotechnical Experimentation Sites. <http://www.geocouncil.org/nges/nges.html>.

Niederleithinger, E., & Taffe, A. (2003): Horstwalde: Konzeption für einen Teststandort zur Pfahlprüfung. Proceedings of Pfahlsymposium 2003, Braunschweig.