Portfolio

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Supervising marine piling at Canary Wharf Crossrail Station

MSc Soil Mechanics, MEng Civil Engineering, DIC

Award-winning Geotechnical Engineer, with experience in United Kingdom, Denmark, Romania and Moldova.

Fascinated by solving unconventional problems

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I am an experienced Geotechnical Engineer with a demonstrated history of working in the Civil Engineering industry. Skilled in Geotechnics and in Project Management. Strong engineer professional with a Master's Degree with Distinction focused in Soil Mechanics from Imperial College London.

I have gathered wide-ranged civil engineering and geotechnical experience in United Kingdom, Denmark, Romania and Moldova.

This portfolio exhibits the variety of my experience. The most prominent of which was gathered while working with Arup Geotechnics in London, where I have obtained a rich and varied engineering experience.

In order to keep this portfolio concise, only one example of each type of experience is presented.

Imperial College London

ARUP

Contents

1. Design experience

1.1 Wood Wharf, Canary Wharf, London

The Wood Wharf development at Canary Wharf in London comprises a mix of uses including residential and commercial (office and retail) Buildings. It will be constructed using multiple construction phases and comprises of around 37 Buildings between 1 and 56 storeys high.

I worked on this project for 21 months as part of a multi-disciplinary team on design of cofferdams, deep foundations, basements, retaining walls in accordance with **Eurocode 7**. Details about my role and contribution to these design packages can be found in the following sections.

The Wood Wharf site has a complex geology with a geological fault and a drift-filled hollow, combined with a tumultuous history with docks in continuous development and WW2 unexploded ordnances – I was involved with developing the Geotechnical Interpretative Report while designing the geotechnical structures described in the following sections.

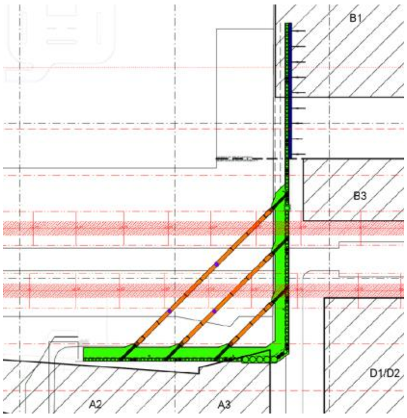
To add to project complexity, London Underground Jubilee Line tunnels are under passing the site – I performed dozens of assessments of project construction impact on the London Underground assets.

Due to the project complexity and size, it involved significant liaison with the client, other design companies, contractors and third parties such as London Underground, English Heritage, and other governmental organizations.

On this project, I had a great opportunity to be involved both in the design and construction phases – throughout the project I worked on site for two months as a Resident Engineer.

1.1.1 L-shaped western secant wall

The retaining structure retains 7m of dock water, the adjacent soil and a historic Banana wall, which is a Grade I listed structure. The L-shaped secant wall is under passed by London Underground Jubilee Line tunnels. This was a detail design.



Plan view of L-shaped secant wall and temporary ties across the dock

Numerous PLAXIS models in accordance with EC7: I built and developed Plaxis 2D models for each of six design sections and analysed them.

Construction sequence: I designed and modelled construction stages for all six design sections.

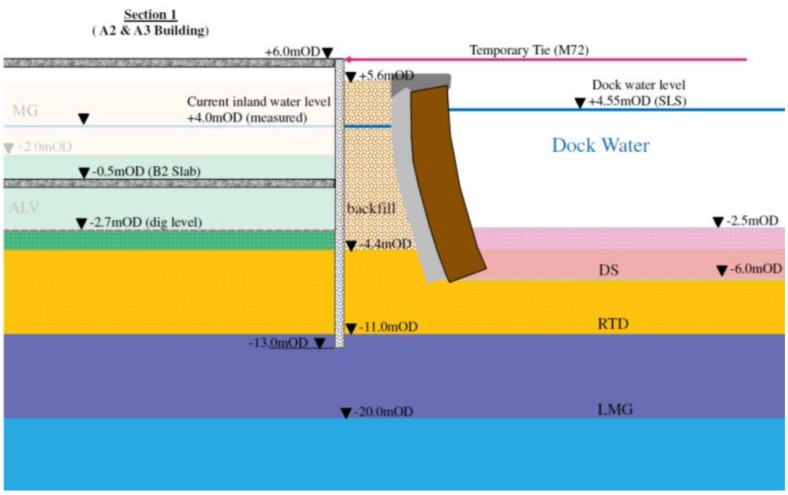
Sensitivity checks: in Plaxis, I tested the sensitivity of the design on dewatering levels, assumed soil and structural parameters, structure-soil interface and prop location and stiffness. Due to the type of temporary support system, the excavation on both sides has to be relatively balanced, therefore I also looked into the sensitivity of the wall to the differences in dig levels.

In-plane shear forces due to temporary ties: the secant pile wall is to be supported by temporary ties positioned at 45° (in plan) to the secant pile wall, and extend across the dock, as presented in the figure. As a result, this support system induces in-plane shear forces. I carried out the calculations for the horizontal, rotational and vertical stability (interfaces between male and female piles) of the secant wall against the tie forces. To determine the resisting force, I used the effective stress on the wall-soil interface from Plaxis.

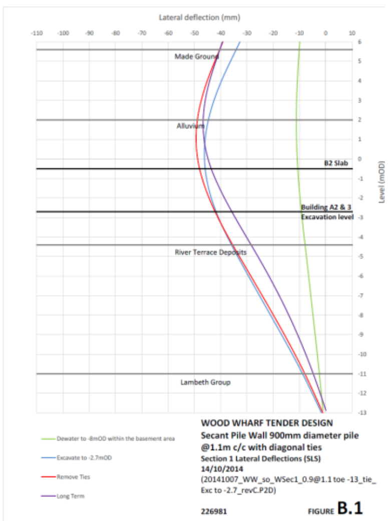
Design of capping beam and ties: was done in collaboration with Structural and Maritime teams. For this, I calculated the subgrade modulus of the wall, i.e. horizontal stiffness at tie level, at several construction stages. I also looked at the temperature effect on the steel ties and how this influences the behaviour of the wall.

Pile concrete section design: I iterated with Structural Engineering team to design the pile concrete sections.

Quality assurance: throughout the project I kept a rigorous QA record with analyses name, date, changes and reasons for changes, results and output.



Design section detail



Plaxis results. Construction sequence analysis

Managing the production of construction drawings: marking-up drawings and managing CAD technicians to produce the drawings.

Risk management register: I assessed the possible CDM and Commercial risks for Arup, client, contractor and third parties.

Construction Design report: throughout the project, I recorded all assumptions and in the end I contributed to the report with the construction sequence, input parameters and analysis details.

Design Review: I took part in all reviews – they were conducted by Duncan Nicholson.

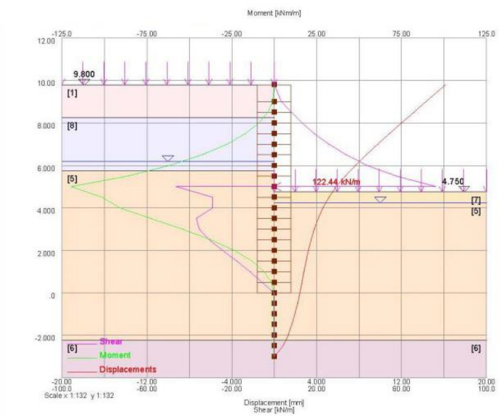
1.1.2 Retaining walls for Roadbox

Secant wall: I have designed the secant wall for the Roadbox, which will be required to retain approximately 9m of soil, to be supported by one level of ground anchors. For this, I used Frew Oasys software. A top-down construction method, where the wall is retained by slabs and load transferred to shear walls, was not an option because the basement shear walls will not be available in the short term, and therefore, ground anchors were required to support the wall in short term. In long term, however, the anchors will be no longer needed as the wall will be supported by the basement structure.

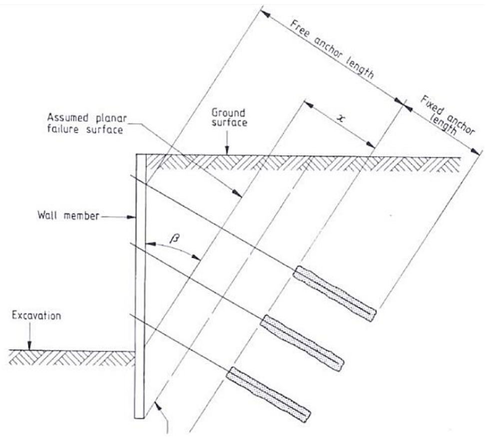
Construction sequence: I started by designing the construction sequence, where the Roadbox is constructed after the secant wall is installed. When the basement construction starts, the ground anchors will be installed from Roadbox slab level. Subsequently, the soil is excavated from under the Roadbox slab to formation level and basement slabs cast.

Ground anchors: I designed the ground anchors to be entirely located in the River Terrace Deposits. Using the SPT N values range I determined the required fixed anchor length based on the force obtained from Frew. Then, I estimated the overall anchor stiffness by considering the extension of the anchor unit tendons over their corresponding free lengths. The calculation of required fixed length, stiffness and anchor prestress was an iterative process, which helped me gain confidence in designing ground anchors.

Structural forces and the displacements: I used Frew to model the construction sequence and determine the structural forces and the displacement of the wall for the SLS, ULS DA1-1 and DA1-2. Afterwards, I used Adsec and a spreadsheet from Arup Structures to determine the required longitudinal and transversal reinforcement for the male secant piles.



Frew model results

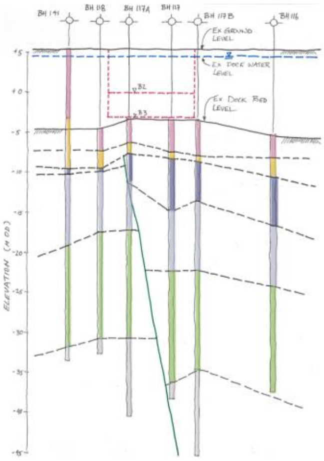


Ground anchor calculation scheme

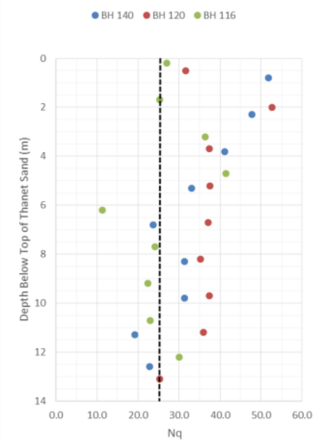
1.1.3 Bearing piles for A, E1 and E2 buildings

The A, E1 and E2 buildings are located along the southern edge of the overall development area and are straddling the existing dock wall. In order to provide a stable working platform, enabling works were required to: (a) construct a temporary cofferdam along the southern edge of the development area; and (b) place reclamation fill between the existing dock wall and temporary cofferdam.

Ground conditions: I studied the available data and the recent ground investigation to establish the ground conditions. To add to the project complexity, the recent ground investigation works confirmed the presence of geological faulting within the immediate site vicinity.



Geological Cross Section

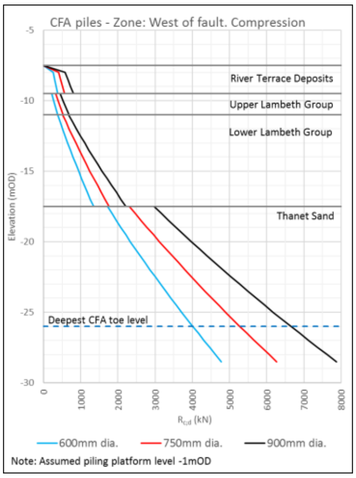


Estimated Nq Factors for Thanet Sand

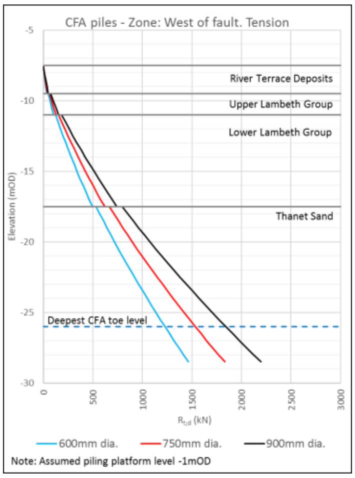
Design basis: Although EC7 provides three separate design approaches (Design Approach1, Design Approach 2, and Design Approach 3), the UK National Annex requires that Design Approach 1 be observed. This approach requires that two possible 'Combinations' to be evaluated, although experience suggests that Combination 1 dominates the structural design of piles and Combination 2 dominates the geotechnical design of piles.

Characteristic soil parameters: I studied site investigation reports, boreholes, SPT, CPT and shear vane tests to determine the ground conditions and material parameters (γ, E', ϕ', c_u, Ko, N_q) relevant to the design of piled foundations.

Pile design: using all the gathered data, I designed the CFA piles in compression and tension for three areas: west of fault, fault area and east of fault. The tension capacity was considered, because there are risks of flooding in the dock, and hence, the piles should be able to counteract the uplifting force.



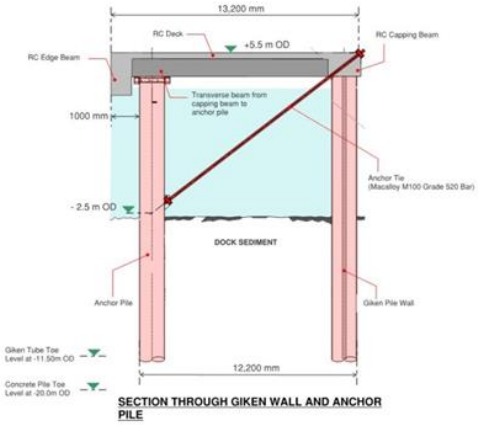
Compression capacity of CFA piles west of fault



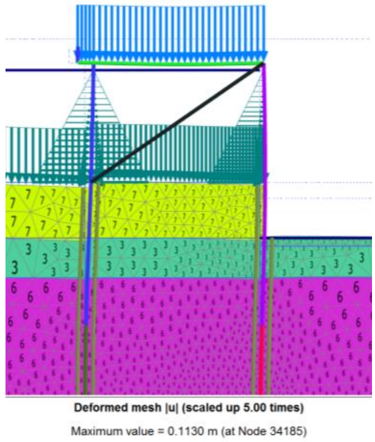
Tension capacity of CFA piles west of fault

1.1.4 Reclamation cofferdam

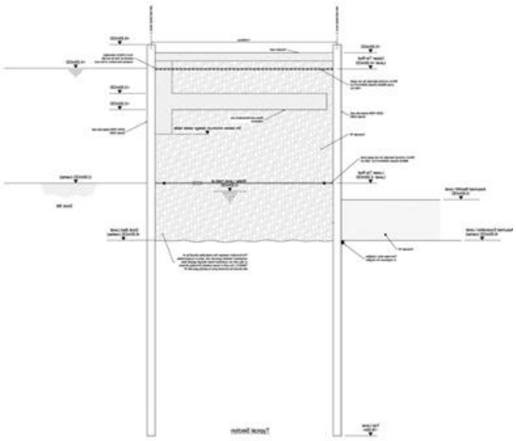
Analysis and design of four solutions: Tied back wall, Double skin cofferdam, Combi wall and a Cantilever wall with ground improvement.



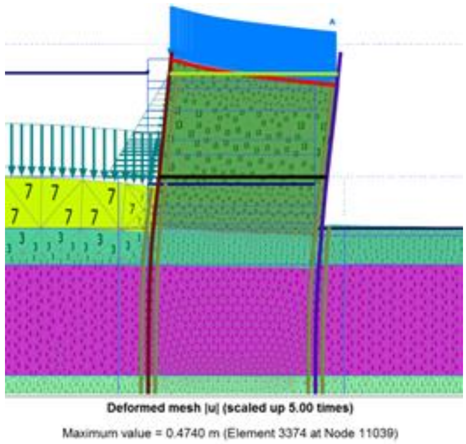
Proposed Tied back wall cofferdam



Deformation of tied back wall cofferdam for SLS load case



Proposed double skin cofferdam



Deformation of double skin cofferdam for SLS load case

Numerous PLAXIS models in accordance with EC7: SLS, ULS DA1-1 and DA1-2 load cases, as well as for the Ship Impact accidental load cases.

Ship impact mitigation: I assessed the geotechnical performance of the cofferdam during possible ship impacts and designing for it, in consultation with Brian Simpson and Paul Morrison and in collaboration with structural engineering team.

Sensitivity checks: I tested the sensitivity of the design on dewatering levels, assumed soil and structural parameters, structure-soil interface and tie location and stiffness.

Quality assurance: throughout the project, I kept a rigorous QA record with analyses name, date, changes and reasons for changes, results and output.

Drawings production: throughout the project, I managed the collaboration with the draftsmen.

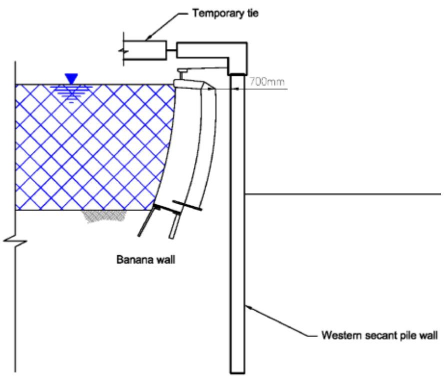
Risk management register: I assessed the possible CDM and Commercial risks for Arup, client, contractor and third parties.

Design Report: throughout the project, I recorded all assumptions and in the end wrote the design report for the cantilever solution with ground improvement.

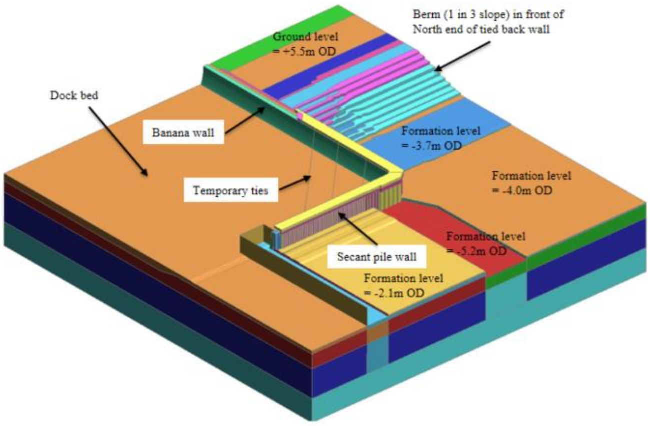
Design Review: I took part in all reviews – they were conducted by Duncan Nicholson.

1.1.5 Assessment of Ground Movement Effects on Banana wall

In order to convince English Heritage that the proposed Wood Wharf Phase 1 development is unlikely to affect the grade 1 listed structure known as Banana wall, forming part of the listed dock structures, I predicted the movements, strains and curvatures of the wall. This was done by extracting displacements of the wall from the existing site wide LS-Dyna model.



Section through the secant wall and Banana wall

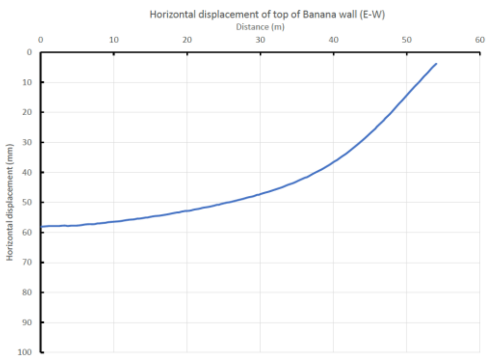


Site wide Dyna model

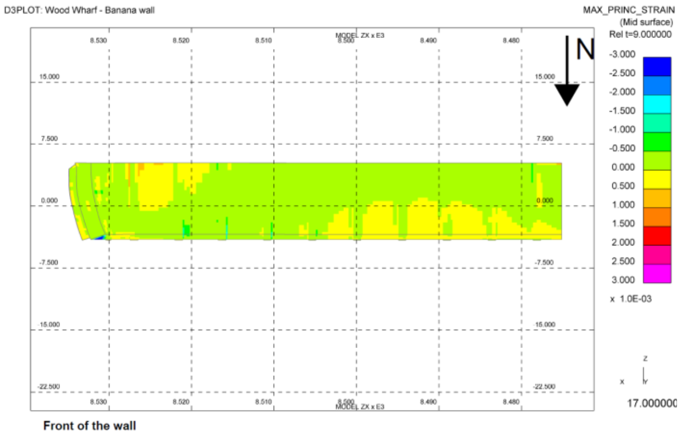
Burland's building damage assessment: the banana wall being a brick structure, I adopted Burland's building damage assessment method to determine the potential damage of the wall due to movements. I was the first in my team to adapt Burland's method for listed walls.

Report for English Heritage: this allowed me to write a report advising English Heritage that the movements during construction will be acceptable for the banana wall – this was critical for the project.

Comprehensive instrumentation and monitoring scheme: in the report, I have also recommended to the client that a comprehensive instrumentation and monitoring scheme should be undertaken as part of the construction to confirm the ground response such that appropriate actions could be carried out during the construction stage to maintain movements within tolerable limits.



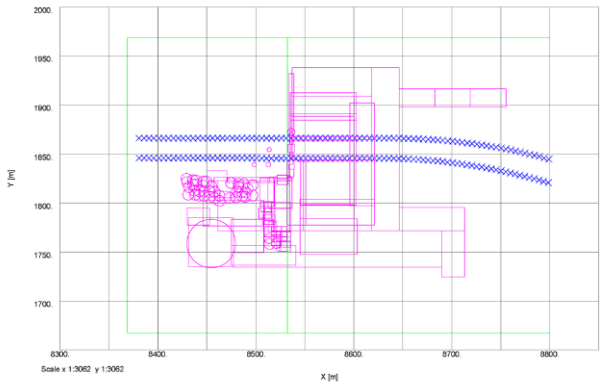
Horizontal displacement of the top of Banana wall
(E-W section)



Principal strains of Banana wall
(E-W section)

1.1.6 Assessment of Ground Movement Effects on London Underground Assets

Following the request of London Underground, I predicted the impact of the proposed Wood Wharf development (11 structures) on the underlying Jubilee Line tunnels.

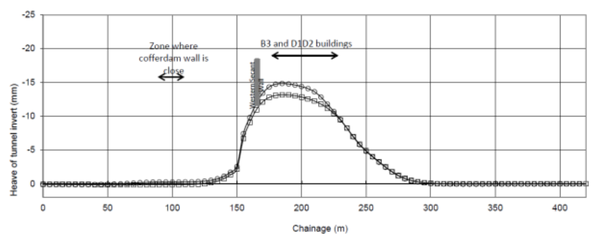


Pdisp model – loading areas

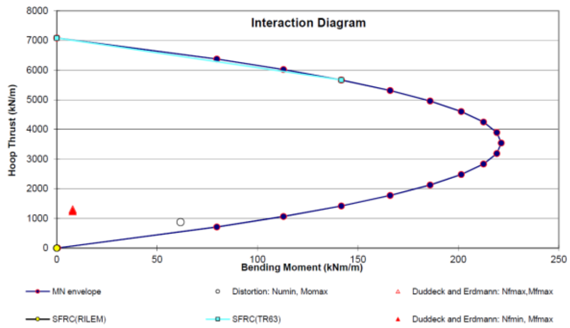
Pdisp results – settlement contours

Ground movement: I modelled and calculated with Pdisp (4 different project revisions) tunnel movements, strains, curvatures, ovalisation and capacity of the cast iron tunnel.

Ground Movement Assessment report: I wrote the Ground Movement Assessment report advising London Underground that the movements would not exceed any of the parameters detailed in their standards.



Pdisp results – tunnel heave



Tunnel lining – interaction diagram

1.1.7 Site wide piling specification

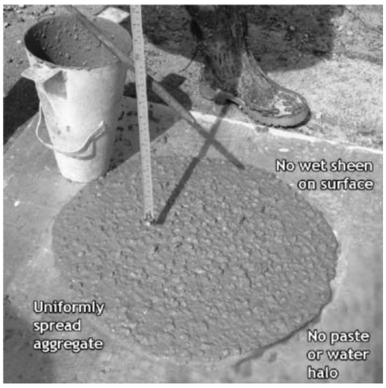
I was responsible for compiling / writing a site wide piling specification which included the following options:

Bored cast-in-place piles – with special requirements and details for:

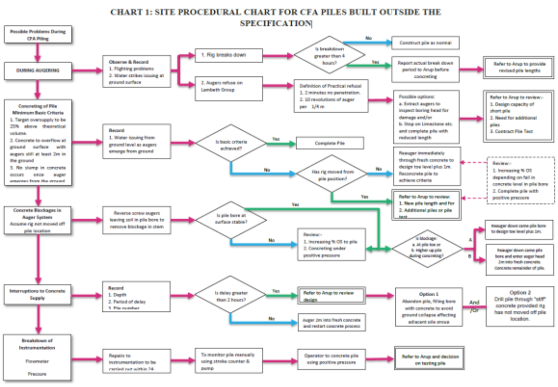
- support fluid;
- temporary and permanent casing;
- plunge columns;
- base hardness tests and Base build up monitoring;
- base grouting using Tube à Mànchette (TAM) system.

Piles constructed using continuous flight augers or displacement augers – with special requirements and details for:

- cased CFA adjacent to the cofferdam and for male secant pile walls;
- including a site procedural chart for CFA piles built outside the specification;
- special requirements for:
    - concrete supply;
    - rate of penetration during excessive penetration or flighting;
    - auger rotation during concreting and extraction;
    - concrete pressure sensor positioning;
    - magnitude of the positive pressure;
    - when primary control of concrete pressure is at the swan neck;
    - availability of concrete pressure at the base of the auger in real time;
    - interruption in the concrete supply or a stop in auger lifting;
    - time period between placing successive concrete batches;
    - monitoring of: rate of auger rotation relative to rate of penetration, auger torque during boring, the number of strokes of the concrete or grout pump, rate of concrete flow, volume of concrete injected.



Visual Stability Index test



Site procedural chart for CFA piles built outside the specification

Secant pile walls – with special requirements and details for:

- Support fluid;
- Requirements for self-hardening slurry mixes such as strength, permeability, shrinkage and durability;
- Special requirements for:
    - Maximum permitted deviation of the finished pile element from the vertical
    - Monitoring of pile deviation;
    - Pile spacing and overlap at commencing level;
    - Depth to which pile interlock must be maintained;
    - Requirement for male pile "soft toe" for piles above London Underground tunnels.

For all structures, the following additional requirements where specified:

- Pre-augering for obstructions;
- Integrity testing;
- Sonic logging;
- Static load testing of piles;
- Instrumentation for piles and embedded retaining walls.

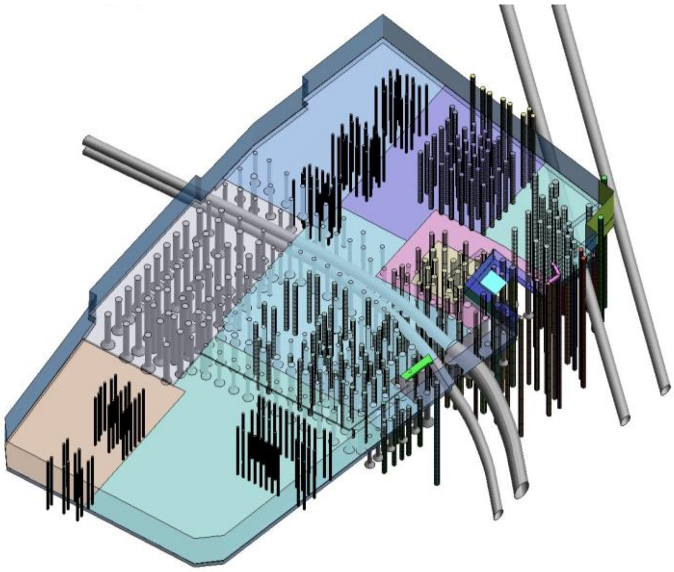
While writing the specification I intensively consulted the ICE Specification for Piling and Embedded Retaining Walls 2nd Edition, published by Thomas Telford Ltd in 2007.

1.2 Shell Centre Redevelopment, London

London's South Bank is set to be transformed by a unique mixed-use development with the famous Shell Centre Tower at its heart. Joint venture developers Canary Wharf Group and Qatari Diar will re-vitalise the area with high quality architecture and much improved public spaces. A mix of offices, homes and retail space will integrate with open and attractive public areas, while new pedestrian routes will connect nearby Waterloo Station with the South Bank of the River Thames.

I worked on this project for 9 months as part of a multi-disciplinary team working on reuse of existing and design of new foundations. I was involved in different stages of this project, especially in the finite element modelling part.

The conditions of the site are very complex due to the Shell Tower that is being preserved and due to the four running tunnels that are going under the site – London Underground Bakerloo and Northern Lines. For this reason, extensive finite element modelling was required.



Dyna site wide model

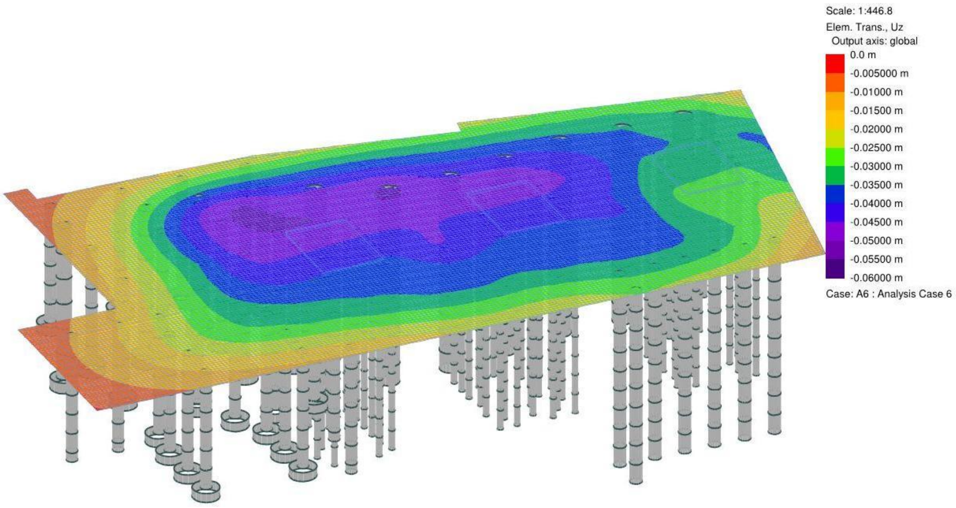
The project being so complex, it involved significant liaison with the client and the structural engineer designer WSP. I was part of the regular coordination meetings that were held both at Arup and at WSP.

I was involved with planning Phase 2 Site investigation to be carried out by Concept, which was intended to study the possibility of reusing the existing under-reamed piles and to check the basement slab thickness in some areas. Most of the Site Investigation was to be carried out inside the existing basement, therefore special planning and equipment had to be used.

1.2.1 Foundations design with GSA Raft

Finite element models: As part of design Stage D we were designing the foundations for the new buildings, which included the reuse of existing foundations. For this, I built finite element models for the entire site, using GSRaft and Hypermesh.

Software limitations: In the design process, I discovered several limitations and issues of GSRaft. For instance, the number of piles that can be included in the model is limited to 100-120 and even then the analysis takes several days to run, which significantly slows down the design process. Moreover, the user does not have the possibility to check the performance of the analysis while it is running, which proved to be quite unstable and was crashing without any reason.

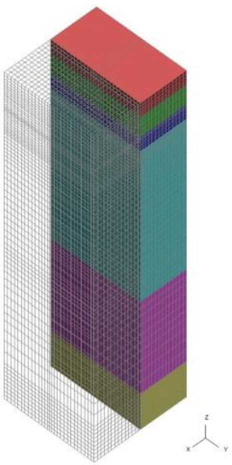


GSA Raft site wide model, includes existing foundations

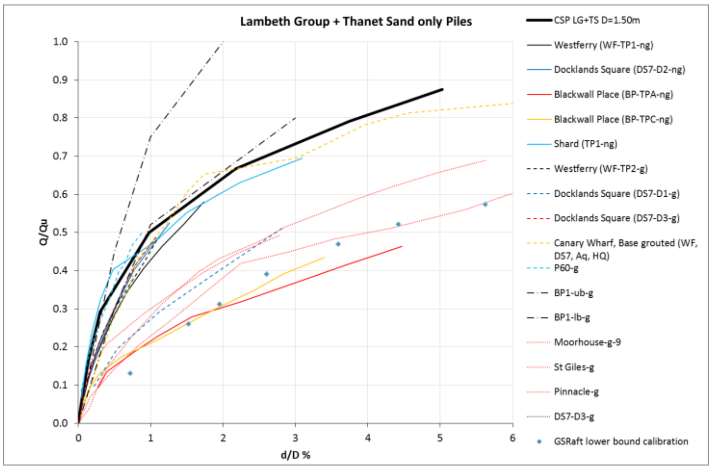
1.2.2 Foundations design with LS-DYNA site wide model

LS-DYNA: due to the limitations of GSARaft mentioned in the previous section, it was decided to use the already existing LS-DYNA site wide model to produce a faster and more efficient foundation design.

Innovative approach: it was decided to depart from the established practice of modelling piles with solid elements, and instead use an innovative method of modelling piles as beams – the LS-DYNA Constrained Soil Pile option (CSP).



FE mesh for CSP pile



Thanet Sand CSP pile. Normalised comparison of CSP calibration with field data

Constrained Soil Pile calibration: I calibrated the load-displacement response of the CSP piles against equivalent solid pile and compared with normalised field data for London Clay piles and Thanet Sand piles. My work reduced the computational resources required to run the site wide model and proved extremely effective for design of piling layout of new foundations. This was highly appreciated by the management.

Technical note: subsequently, I wrote a technical note on calibration of CSP piles, explaining the procedure I used step-by-step – the document was intended to help future projects that will use CSP piles.

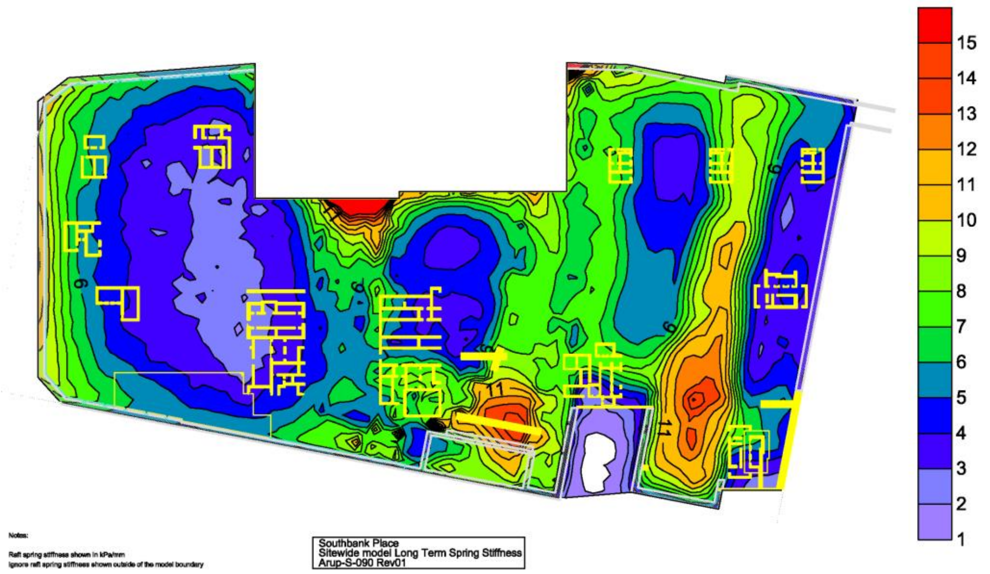
1.2.3 New pile layout and spring stiffnesses for Structural Engineer

Pile layout: I was closely involved with designing the new pile layout in collaboration with the Structural Engineer (WSP).

Spring stiffnesses: for the iterations with WSP, I was in charge of producing the output for settlement and foundation spring stiffnesses. For this, I used Surfer software and presented data in a standardized and suitable form.

Utilisation factor of the new and existing piles: because we were reusing the existing piles, it was essential that the load is distributed evenly and within the capacity of each pile, therefore I was closely assessing the utilisation factor of each new and existing pile.

Trigger limits: Using the predictions of the site wide model, I have determined the trigger limits for the monitoring equipment (piezometers, tiltometers, extensometers installed in existing piles, prisms, levels) installed on site to assess the development of the construction process.



Long term foundation spring stiffness of the site wide model (kPa/mm)

1.2.4 Construction effect of large diameter piles in the exclusion zone of the LUL Northern Line tunnels

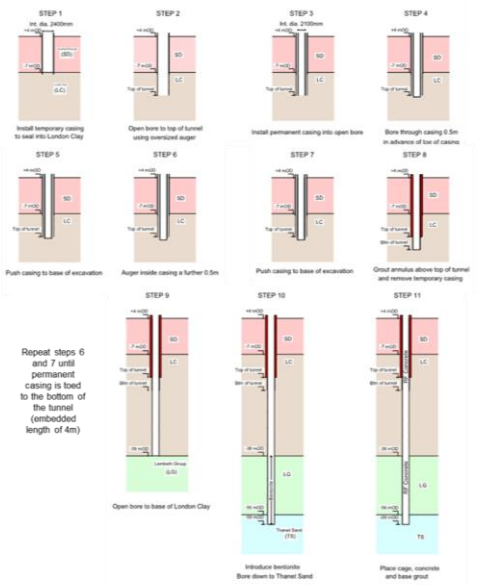
For two of the buildings, it was required to install bearing piles of up to 2.1m in diameter in close proximity to the existing London Underground Northern Line tunnels, within the 3m lateral exclusion zone.

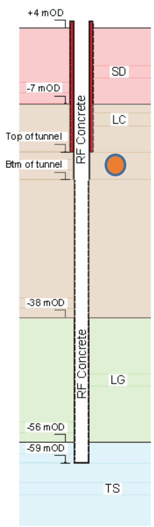
Construction sequence: I was involved with designing the construction sequence for this complex operation. The solution was:

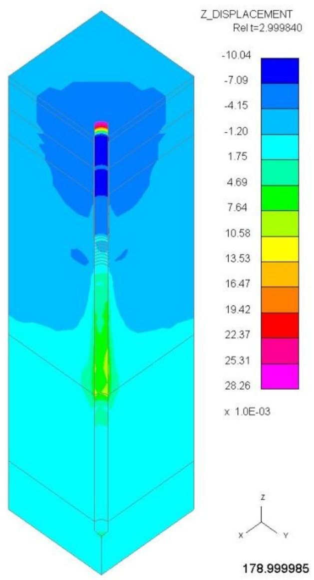
1. Install a temporary casing to seal into London Clay;
2. Open bore to top of tunnel using oversized auger;
3. Install a permanent casing into the open bore;
4. Bore through the permanent casing 0.5 m in advance of toe of casing;
5. Push casing to the base of excavation;
6. Auger inside casing further 0.5 m;
7. Push casing to base of excavation;
8. Repeat until permanent casing is toed to the bottom of tunnel;
9. Open bore to base of London Clay;
10. Introduce bentonite and bore down to Thanet Sand;
11. Place cage, concrete and base grout.

3D model: I built a detailed three-dimensional finite element analysis to assess the construction effect of large diameter 2.1m diameter Thanet Sand piles at a minimum 1m offset from the Northern Line tunnels.

Compared against a CAT3 checker: the results of the model were comparable with the predictions done by Geotechnical Consulting Group, who were the CAT3 checker for the project.







Construction sequence

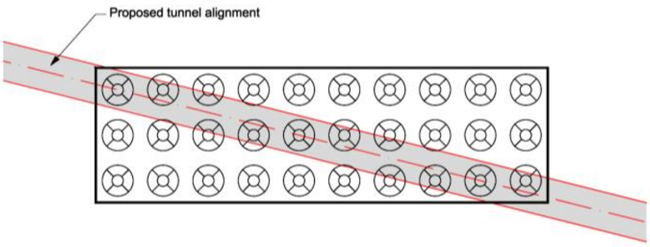
Dyna model results

1.3 Imperial College MSc Dissertation: Tunnel-Pile Clash Mitigation

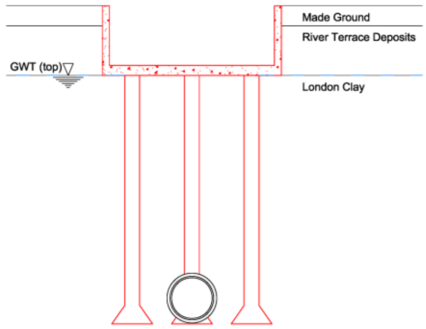
Introduction: in large urban environments with congested subterranean spaces, many large infrastructure projects are currently being purposed. Due to the high value of land the new projects are constructed deeper into the ground. This increases the potential of both expected and unexpected clashes between new and existing structures.

Scope: my dissertation investigated the problem of the clash of a new tunnel alignment with an existing pile foundation and studied mitigation measures aimed to reduce the impact on the building. This has been achieved by performing two-dimensional finite element analyses with Imperial College Finite Element Program (ICFEP).

Finite Element Analyses: with a set of analyses, I modelled clashes with free-headed single and grouped piles. A parametric study was performed to examine the influence the pile cap bending stiffness has on the settlement of the trimmed pile. The dissertation also investigates the behaviour of a typical building during the tunnelling works of the Bank Station Capacity Upgrade project in London. The analyses explored the possibility that the proposed tunnel alignment clashes with the pile foundations of an existing building. Two distinct cases were considered where the building is founded on straight shafted and on under-reamed piles, and the position of the tunnel also varied. Furthermore, the study explores the possibility of mitigating the tunnel-pile clashes and reducing the impact on the existing building.

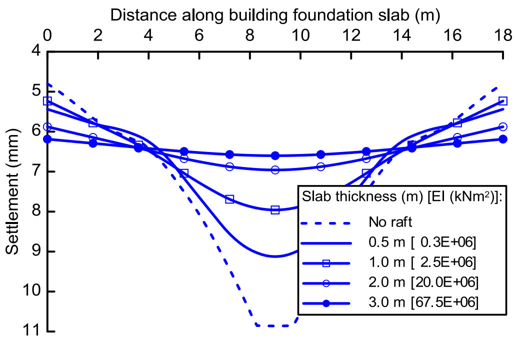


Plan view of the assumed building and the proposed tunnel alignment

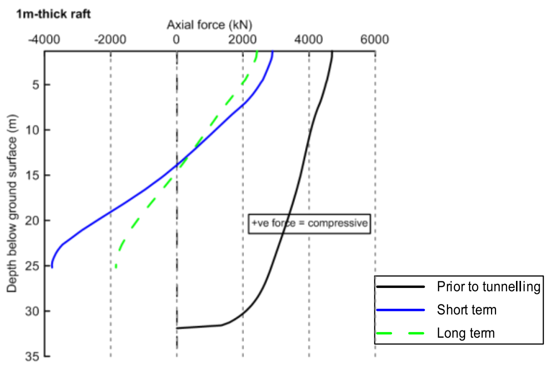


Vertical section through the tunnel-pile clash

Results: the research presented in my dissertation has led to a better understanding of the pile-tunnel interaction problem. It has been shown that the impact of cutting a free-headed pile is considerable and that the effect of clashing with an under-reamed pile is significantly larger than with a straight shafted pile. Due to the loss of base and part of shaft capacity the pile settles by creating a deep narrow surface settlement trough, considerably exceeding the corresponding greenfield profile. During the excavation of the tunnel, a large axial tensile force develops in the bottom part of the pile, which can lead to a tension crack if the pile is unreinforced. The analyses of the building showed that for the considered construction sequence, stratigraphy, soil parameters, pile and tunnel dimensions and loading conditions, the impact of clashing both on the building and on the tunnel is either acceptable or can be mitigated, depending on the design tolerances. It is concluded that job specific assessment of the impact of the clash both on the building and on the tunnel may lead to economies in the design of new infrastructure.



Deformation of pile raft with different thicknesses at the end of tunnel excavation



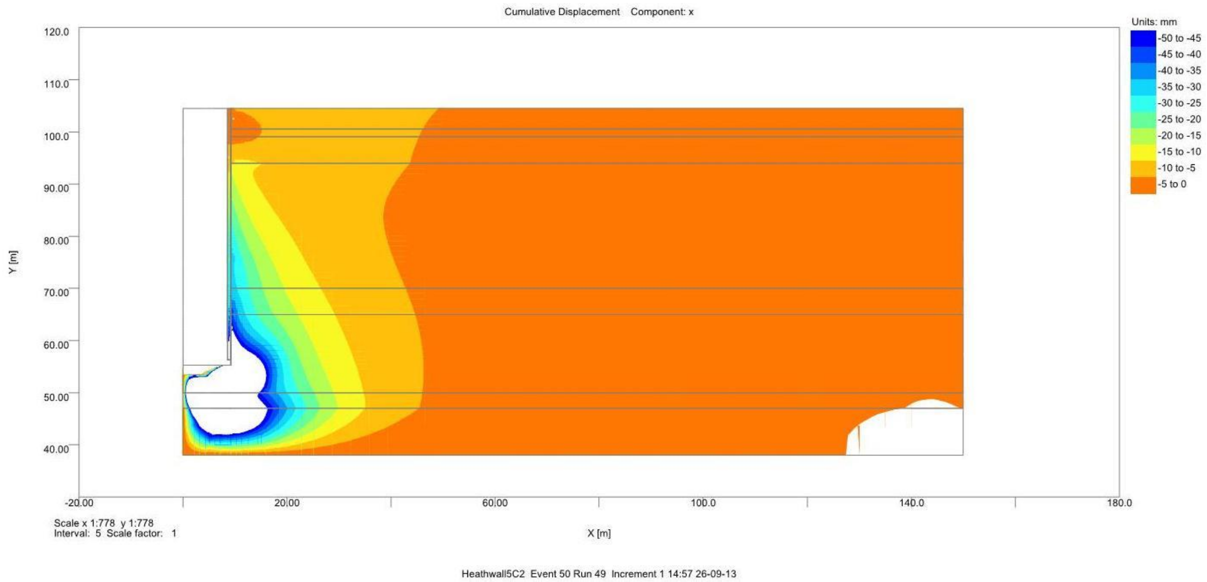
Distribution of axial force in the cut pile with an 1m-thick raft scenario

1.4 Other projects

1.4.1 Ground movement assessment - Thames Tideway Tunnel Gas Main

Using Oasys SAFE, I predicted the ground movements arising from the construction of a shaft, which subsequently were used to determine the impact on the adjacent National Grid cast iron gas main.

With this assessment we have saved Thames Tideway Tunnel many hundreds of thousands of pounds. Therefore, TTT got tremendous value and was very happy.



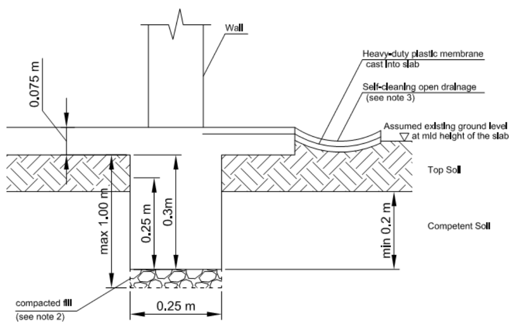
Oasys SAFE – displacement results

1.4.2 Low-cost housing solution for El Salvador

This was a charity project, part of REDR UK together with Arup Cause in collaboration with Imperial College London.

For this project, I designed shallow foundations for residential houses in highly seismic areas in accordance with US standards.

Particularities of this project were: highly seismic area, limited ground information and varied soil parameters.



Shallow foundation design

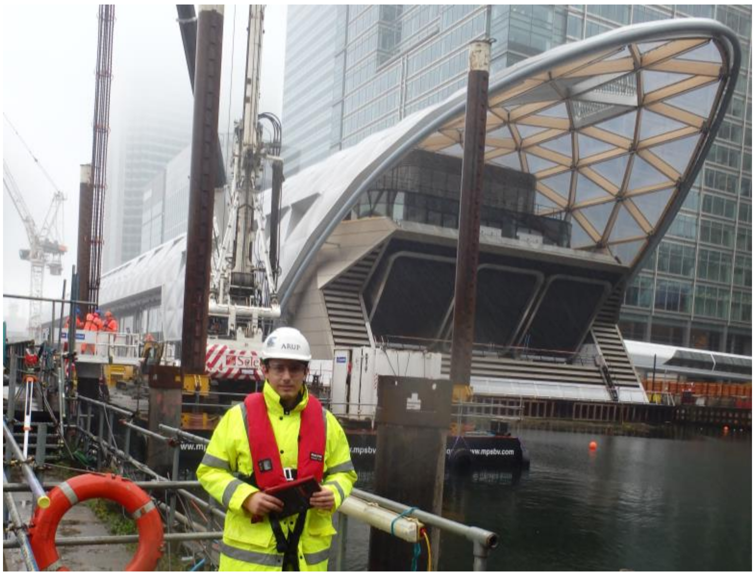
Construction in El Salvador

2. Site experience

2.1 Canary Wharf Crossrail Station

2.1.1 North Quay piling

As part of the Canary Wharf Crossrail Station, a new deck had to be built in the North Quay. The deck was designed to be installed on 20 marine piles. I was the main Resident Engineer on site for the construction of these piles. The piles were constructed with pilling rigs that were working from barges.



Myself supervising marine piling at Canary Wharf Crossrail Station

Difficult ground conditions: on the dock bed there was a thin layer of Dock Sediment, followed by 6-8m of Lambeth Group clay, that was under laid by Thanet Sands. The piles had to be constructed with toes into the Thanet Sands. Even though, the last 2-3m were in sands, the contractor wanted to bore the piles without support fluid. We, as designers, agreed to this, but we set very tight requirements for shaft and base stability measured by material build-up on the base of the bored pile. In the case, the tight requirements were not met, the contractor had to re-bore the pile or use support fluid.

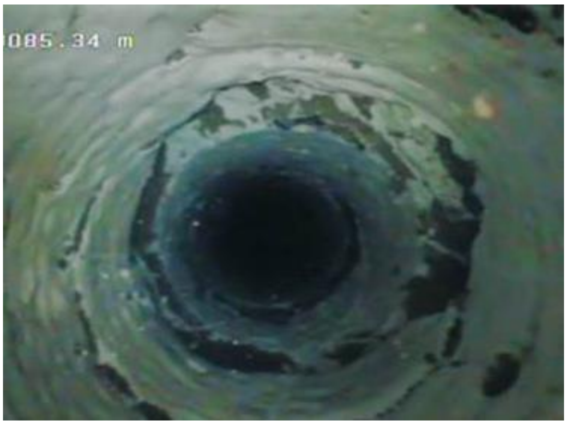
Construction sequence: pile construction was started by driving temporary casings into clays to seal the bore. Subsequently, the pile was bored inside of the temporary casing until the design depth is reached.

Shaft and base inspection: as mentioned above, tight requirements were set for shaft and base stability. This was checked with CCTV inspection of casings, shaft and base of pile.

New technology support fluid: for this project, we used polymers as support fluid – relatively new technology for the UK – one of the first uses in Canary Wharf. Polymer has several advantages over bentonite – it is more stable in time and generally infinitely re-usable and very small amount of polymer is normally required for construction works. The disposal cost of bentonite is quite high, while the disposal of polymer can be readily conducted by adding an oxidizer such as calcium hypochlorite. Polymer fluid is also a great clay inhibitor, preventing the swelling and sticking of reactive clays.

Polymer fluid use: after three piles had severe problems with shaft and base stability, the contractor decided to use polymer fluid for the remaining nine piles. I closely monitored that the use of polymer and that its disposal was in accordance with the standards and the pilling specification.

Verticality issue: there were two piles that were installed largely out of verticality tolerance. I went back to the office and studied closely the entire design again. I modelled in Oasys Alp those two piles with the 'as-built' eccentricity – my calculations proven that the piles could sustain the design load anyway. After this and after checking the sonic logs, I 'signed-off' these two problematic piles.



CCTV pile inspection

Rebar cage installation

Rigorous H&S and PPE: because all works were done in the docks, the Health & Safety regulations were very strict. All crew members and engineers had to wear special PPE for work on water.

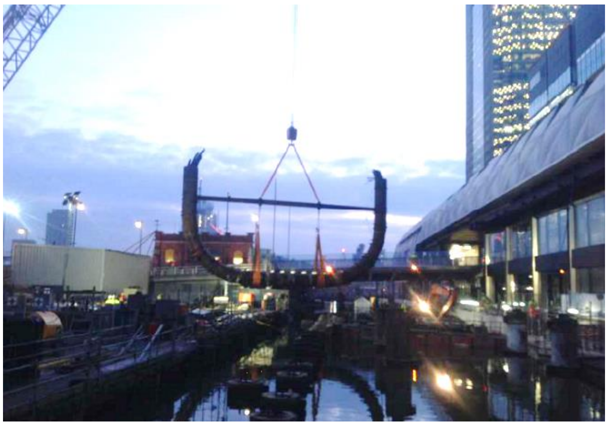
Significant liaison with stakeholders: I interacted intensively with the design team (Arup), client (Canary Wharf Group) and the contractor (Expanded).

Sonic logging interpretation: due to the complexity of ground conditions and the risks related to it, all piles had sonic tubes installed. Sonic logging allowed us to check the integrity of the concrete throughout the pile length. As the main RE on site, I had the responsibility to assess and interpret all pile sonic logs. I also 'signed-off' piles for the contractor to be able to grout the sonic tubes after they were sonic logged.

2.1.2 U-tube installation

Canary Wharf Contractors asked Arup to supervise the installation of an U-tube on the dock bed. Prior to the site works, I have communicated with Arup Structures to understand the design assumptions and movement tolerances. Knowing this, I have communicated with and reviewed contractor's methodology of cleaning the dock bed of Dock Sediment and insuring the U-tube is installed at the design position without any subsequent intolerable movement.

Prior to U-tube installation, I have briefed the Arup RE on site who had to check that the dock bed is clean and suitable for U-tube installation. During the works I was the contact person in the office and advised the Arup RE in taking decisions.



U-tube installation process

2.2 Chelsea Barracks, London

This world-class masterplan extends on 52,500 m², comprising 448 residential units, a public sports facility with swimming pool, a medical centre and, a community centre.

Being a Resident Engineer on such a large site involved significant interaction with the client (Qatari Diar), design team (Arup), the contractor (Keltbray) and third party assets owners such as Thames Water.

On this project, I was the Resident Engineer on site during two phases:

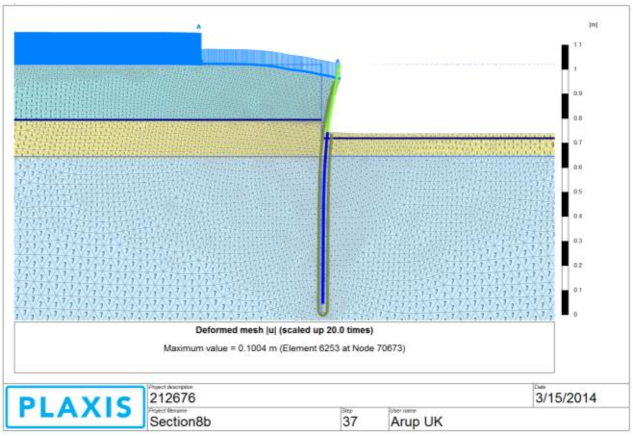
Piling probing and clearance ahead of secant wall construction: due to the complex past of this central London site, building on it is a real challenge. Before starting to construct the secant pile wall, we had to make sure that the area is clean of any obstacles and record any historical findings or constructions. To add to its difficulty, the project had a complex foundation and basement construction sequence.

In this role, I monitored the quality of works and especially that no obstacles are left behind. I also monitored ground water levels and presence of any suspicious structures.

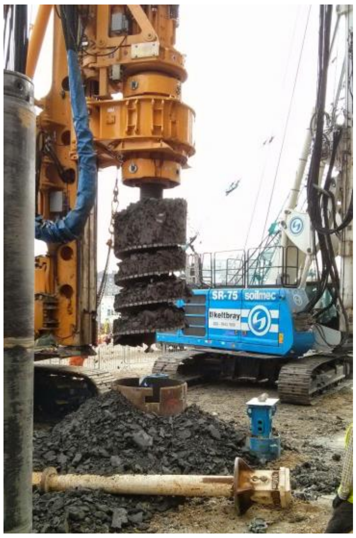
Piling probing and clearance works

Piling works for the construction of the secant retaining wall: this role involved supervising the work of four pilling rigs at once, and in particular: bore quality, dimensions and tolerances; rebar quality and dimensions; concrete quality and concreting level.

One year before coming as an RE on site, I assessed the impact of secant pile construction and basement excavation on adjacent buildings, using Plaxis.

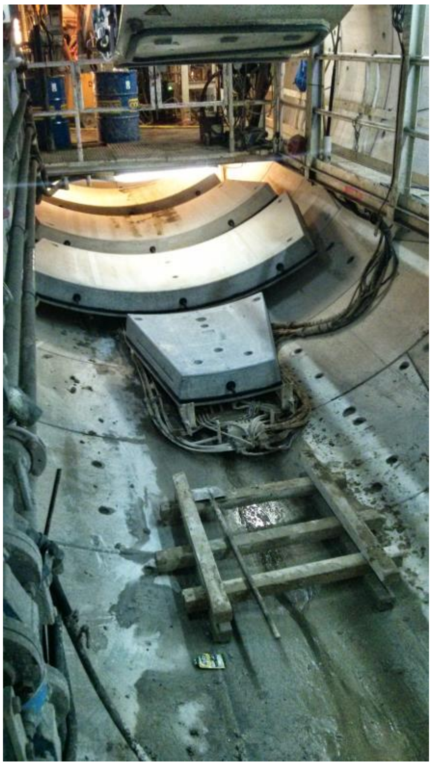


Plaxis analysis – secant wall design



Secant wall construction

2.3 Site visit: Construction of Bucharest's 5th Metro Line in 2015

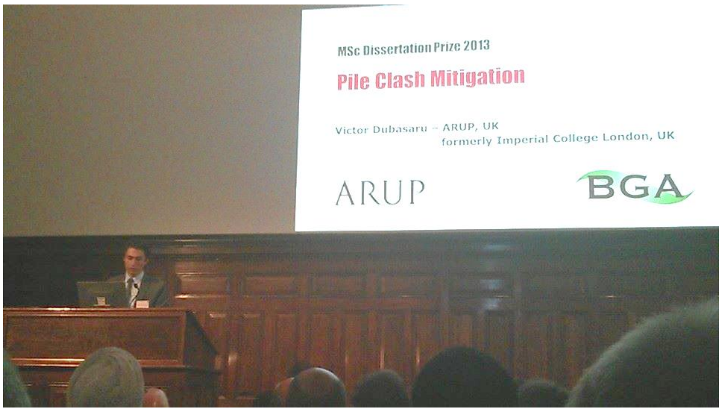


3. Awards and achievements

Below are presented my awards and achievements that are relevant for this portfolio. The certificates are attached at the end of this document.

MSc in Soil Mechanics at Imperial College London, graduating with Distinction as one of the top two students in a class of 30 (Sep 2013).

BGA MSc Dissertation Prize – annual award for the best MSc dissertation on a geotechnical topic – presented my dissertation at the Annual BGA Conference (Jun 2014).



Soil Mechanics Prize – annual award to a student displaying excellence in the advanced course in Soil Mechanics, awarded by the Dept. of Civil and Environmental Eng. at Imperial College London (May 2014)

Young Geotechnical Engineer of the Year (up to 26) finalist (Oct 2014)

GE NEXT GENERATION AWARDS 2014
FINALIST

MERIT game finalist. As part of a team, managed own fictional construction company for a simulated period of time in competition against other rival teams (May 2014)

Million Makers – I was part of a team taking part in a fundraising competition organized by The Prince's Trust. We managed to rise £10k for the Prince's Trust. I held the position of team's treasurer (Oct-Dec 2014)

4. Skills and courses

4.1 Computer skills

Plaxis, ICFEP, LS-Dyna, Hypermesh, D3Plot, Oasys SAFE, GSRaft, Frew, Alp, Pdisp, Adsec, ETABS, AutoCAD;

Excel and other MS Office software (+ Microsoft Project).

4.2 Language skills

Mother tongue Romanian

Very good English

Very good Russian

Basic German

4.3 Courses

Below are presented courses that I followed that are relevant for this portfolio.

Advanced Course on Computational Geotechnics – Plaxis. Schiphol, The Netherlands. The certificate for this course is attached at the end of this document (10 - 13 March 2014).

The Stratigraphy of the Lambeth Group – Logging course by Dr. Jacqueline Skipper from Geotechnical Consulting Group (03 March 2014).

5. Publication list

Dubasaru, V., Zdravkovic, L., Taborda, D.M.G., Hardy, S. (2015). Influence of pile raft stiffness on building behaviour in a tunnel-pile clash scenario, XVI European Conference on Soil Mechanics and Geotechnical Engineering 2015, Edinburgh, UK.

Link: http://www.icevirtuallibrary.com/doi/abs/10.1680/ecsmge.60678.vol2.049

Dubasaru, V. (2013). Pile clash mitigation, MSc, Imperial College London.

(not available online)

Gasso-Tortajada, V., Dubasaru, V., Rojas, C., Brøchner, T., Green, O. (2010) The potentials of a novel acoustic sensor approach for determining soil texture and structure. Made in partnership with the Dept. of Biosystems Engineering, Aarhus University. Proceedings of the NJF Seminar 438, Sensors for soil and plant mapping and terrain analysis, NJF Report vol. 6, no.7 2010 (ISSN 1653-2015), Skara, Sweden, pp. 48-50.

Link:
https://www.researchgate.net/publication/233725698_NJF_Seminar_438_Evaluation_of_ground_penetration_radar_GPR_for_characterization_of_silage_stack_compaction

Harbic, C., Cismas, C., Dubasaru, V., Botis, M. (2011) Aspects regarding reduction of general torsion in the structures of the Brasov Campus. Bulletin of the Transilvania University of Brasov, Series I: Engineering Sciences, Vol. 4 (53) No. 2 (ISSN 2065-2119), Brașov, România, pp. 153-160.

Link: http://webbut.unitbv.ro/BU2011/Series%20I/BULETIN%20I/Harbic_C.pdf

6. Reference letters

Your ref
Our ref
File ref

ARUP

13 Fitzroy Street
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W1T 4BQ
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d +44 20 7755 3138
stuart.hardy@arup.com
www.arup.com

To whom it may concern

20 October 2015

Victor Dubasaru – Reference Letter

I have known Victor Dubasaru since he started his MSc dissertation at Imperial College London in the academic year 2011/2012. Victor chose a topic that I had suggested to the lecturers at Imperial and I was very pleased to be involved with his research as an industrial collaborator.

After completing his MSc, Victor joined the geotechnics group in Over Arup and Partners Limited where I am an Associate Director and team leader.

During his time at Arup Victor has worked directly for me on the Southbank Place project which involves the redevelopment of the Shell headquarters in the Waterloo area of London. Victor undertook state-of-the-art three dimensional finite element analysis to assess the re-use of existing foundations and to inform the design of the new foundations.

I was also pleased to support Victor in his application to become Ground Engineer magazine's young geotechnical engineer of the year (a stiff competition in which Victor was a finalist) and his success in winning the best MSc prize from the British Geotechnical Association. Victor also went on to be lead author and to present a joint paper on his MSc work at the 16th European Conference on Soil Mechanics and Geotechnical Engineering in September 2015.

In addition to the work Victor did for me, I am aware of the wide ranging experience Victor has obtained on other projects in which he has been involved, particularly the work for Canary Wharf Group.

Throughout my involvement with Victor I have found him to be a very gifted geotechnical engineer who is keen to learn and a pleasure to work with. He is engaging, thorough and extremely reliable. Victor will go the extra mile to ensure what he delivers is of the highest quality work, on time and within budget. He is also developing a broad understanding of issues beyond the technical, for example commercial, contractual and health and safety.

I would have no hesitation in recommending Victor for any future position. He is an extremely capable engineer who will undoubtedly rise to any challenge that is offered to him. I wish him all the success he will undoubtedly achieve in the future.

Yours faithfully

Stuart Hardy
Associate Director

Imperial College London

Department of Civil and Environmental Engineering
Imperial College London
Skempton Building
South Kensington Campus
London SW7 2AZ

Tel: +44 (0)20 7594 6076; Fax: +44 (0)20 7594 5934
l.zdravkovic@imperial.ac.uk
www.imperial.ac.uk

Lidija Zdravkovic BSc(Eng) MSc PhD DIC
Professor of Computational Geomechanics

29th November 2013

-

TO WHOM IT MAY CONCERN

RE: Mr. Victor Dubasaru

It is with great pleasure that I write in support of Victor Dubasaru for the award of the national Academic Excellence Prize. Victor has just completed, in September 2013, a one year MSc course in Soil Mechanics in the Department of Civil and Environmental Engineering at Imperial College London. I teach three modules on this course and I also supervised his MSc dissertation.

Victor attended regularly all the lectures, submitted the required coursework on time, set all five exams in May 2013 and completed a research-based MSc dissertation in August 2013. For his overall performance on the course he obtained an MSc degree with Distinction, as one of the top 2 students in the class of 30. His MSc dissertation, titled "Pile clash mitigation", was awarded the Soil Mechanics Ltd Prize as the best dissertation in the class. It has also been nominated for the UK national competition for the best MSc dissertation in Geotechnics sponsored by the British Geotechnical Association, the results of which will be known in June 2014.

I personally found Victor very pleasant and gratifying to work with. He was very active in my classes, regularly asking questions and promoting discussions. In particular throughout his MSc project he demonstrated high level of independence in thinking and reasoning. Dealing with a numerical analysis of a complex soil-structure interaction problem, Victor was able to indentify a number of important practical aspects that needed to be captured in the numerical model. Having performed numerical analyses he was then able to interpret the data in a form that could be easily understood and applied in practical design. His thesis is written very professionally and in excellent English, which was particularly impressive considering that this is not his first language.

The Soil Mechanics MSc course at Imperial College has a very international structure of student population and requires not only individual, but also team work on group projects in the laboratory and field practicals. Victor has demonstrated great skill as a team worker, in supporting and helping less able students for his group to achieve the best possible result. This is highly commendable and is a reassuring quality of Victor's character.

Overall, I believe that Victor is an excellent example of a young scholar deserving of the Academic Excellence Prize and I place my support to his nomination without any hesitation.

Yours faithfully,

L.Zdravkovic

Prof. Lidija Zdravkovic

7. Certificates

Imperial College
London

SCIENTIA
SCIENTIA IMPERII DECUS ET TUTAMEN

The Council of the Imperial College of Science, Technology and Medicine has conferred on

Victor Dubasaru

the degree of

Master of Science with **Distinction**

in Soil Mechanics

on **1 November 2013**

Keith O'Nions

President & Rector

Academic Registrar

Sealed by authority of the Council

BGA

· THE BRITISH ·
GEOTECHNICAL
ASSOCIATION

This is to certify that the

2013 MSc Dissertation Prize

was won by

Victor Dubasaru

for his dissertation

Pile Clash Mitigation

BGA Chairman

pp *Chairman of the Competition Subcommittee*

Imperial College
London

SCIENTIA
SCIENTIA IMPERII DECUS ET TUTAMEN

Certificate

2014 Soil Mechanics Prize

awarded to

Victor Dubasaru

For annual award to a student displaying excellence in the advanced course in Soil Mechanics

Nick Buenfeld.

Professor Nick R Buenfeld
Head of Department

Robert L Vollum

Dr Robert L Vollum
Prizes Coordinator

Department of Civil & Environmental Engineering

PLAXIS

essential for geotechnical professionals

PLAXIS Course Certificate

This is to certify that

Victor Dubasaru

has completed the Advanced Course on

Computational Geotechnics

held on March 10 - 12, 2014

at Schiphol, The Netherlands

This course entitles for 24 Professional Development Hours (PDH)

On behalf of Plaxis,

Dennis Waterman

Plaxis bv

Computerlaan 14
2628 XK Delft
The Netherlands

P.O. Box 572
2600 AN Delft
The Netherlands

Tel +31 (0)15 2517 720
Fax: +31 (0)15 2573 107
www.plaxis.nl

ROMÂNIA

MINISTERUL EDUCAȚIEI, CERCETĂRII, TINERETULUI ȘI SPORTULUI

Seria C Nr. 0298246

L.S.

DIPLOMĂ DE LICENȚĂ

T.S.

UNIVERSITATEA "TRANSILVANIA" DIN BRAȘOV

în baza absolvirii **Ciclului I – Studii universitare de licență** și a promovării examenului de finalizare a studiilor, în sesiunea IULIE 2011,
la propunerea FACULTĂȚII DE CONSTRUCȚII

conferă

Domnului ***DUBĂSARU D. VICTOR***,
născut... în anul 1988, luna MARTIE, ziua 20,
în localitatea CHIȘINĂU,
județul ..., țara R. MOLDOVA,
absolvent... a l UNIVERSITĂȚII "TRANSILVANIA" DIN BRAȘOV
FACULTATEA DE CONSTRUCȚII

titlul de INGINER
în domeniul INGINERIE CIVILĂ

programul de studii/specializarea CONSTRUCȚII CIVILE, INDUSTRIALE ȘI AGRICOLE

240 **credite de studiu (ECTS).**

Se conferă toate drepturile legale titularului diplomei.

RECTOR, **Prof. dr. ing. Ion VIȘA** L.S.	**SECRETAR ȘEF,** **Ing. Mihaela-Alina POPESCU**	**DECAN,** **Prof. dr. ing. Ioan TUNS**

Nr. 14221 din 23.05.2012

Diploma este însoțită de SUPLIMENTUL LA DIPLOMĂ

MINISTERUL EDUCAŢIEI, CERCETĂRII, TINERETULUI ŞI SPORTULUI
Universitatea *Transilvania* din Braşov
Rectorat
500036 Braşov, B-dul EROILOR nr. 29 tel./fax +40268410525, +40268412088
www.unitbv.ro

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TRANSLATION FROM ROMANIAN

Series C No. 0298246
ROMANIA
THE MINISTRY OF EDUCATION, RESEARCH, YOUTH AND SPORT

Impressed stamp.
Holder's photograph. Stamp.

BACHELOR DIPLOMA

TRANSILVANIA UNIVERSITY OF BRASOV, considering the holder's graduating from the 1st Cycle - B.A. academic studies and his passing the B.A. examination in the session July 2011,at the proposal of the FACULTY OF CIVIL ENGINEERING

grants to

Mr. DUBĂSARU D. VICTOR,
born in the year 1988, month March, day 20, in Chişinău, Moldova, graduate of *TRANSILVANIA* UNIVERSITY OF BRASOV, THE FACULTY OF CIVIL ENGINEERING
THE TITLE OF ENGINEER
in the field of CIVIL ENGINEERING,
the study programme CIVIL, INDUSTRIAL AND AGRICULTURAL BUILDINGS.

240 ECTS

The holder of this diploma is entitled to benefit from all the legal rights accordingly.

Rector, Prof. Eng. Ion VIŞA, PhD.: illegible signature. Stamp.
Dean, Prof. Eng. Ioan TUNS, PhD.: illegible signature.
Chief secretary, Eng. Mihaela-Alina POPESCU

No. 14221 of May 23rd, 2012

RESULTS OF THE B.A. EXAMINATION

EXAM SUBJECTS	GRADE	CREDITS
General knowledge in the study area	-	-
B.A. PROJECT	10 (ten)	-
B.A. EXAM AVERAGE	10 (ten)	

DEAN, Prof. Eng. Ioan TUNS, PhD.: illegible signature
Faculty chief secretary, Carmen-Mihaela CAZAN: illegible signature.

I hereby certify the accuracy of this translation of an official Romanian document.

Certified Translator,
Mona Arhire
(No. 219/1996 Romanian Ministry of Justice)

Rector,

Prof. Eng. Ioan Vasile ABRUDAN, PhD