

## King's Gate House & The Zig Zag Building

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Ann Marie studied Civil Engineering at Queens University of Belfast, where she completed her MEng in 2012.

She then joined Pell Frischmann's Geotechnical Engineering team in London, where she has been involved in a variety of structural and geotechnical projects.

**Keywords:** *London Underground Limited, Extensive Excavation, 2D Finite Element Analysis, Ground movements, Monitoring.*

### 1. Introduction



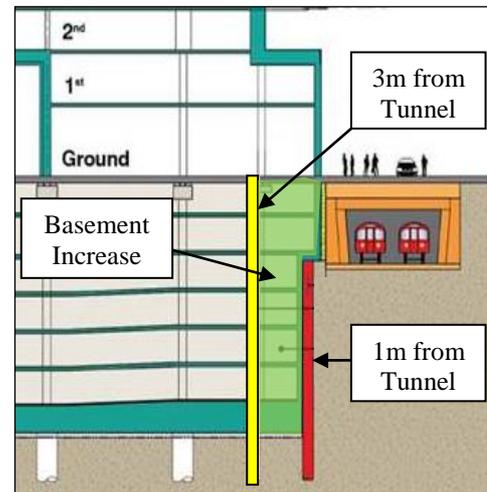
Pell Frischmann was commissioned by Land Securities in 2010, for the redevelopment of Kingsgate House, London.

This mixed use scheme will replace Kingsgate House, a gargantuan ground scraper which was occupied by UK Trade and Investment, with two new mixed use buildings. The scheme involves extensive excavations and the construction of a basement next to the existing London Underground Limited Circle and District line, which runs close to the northern boundary of the site.

### 2. Content

Due to the extensive basement excavations (approximately 20m), it was challenging to receive approvals for construction from London Underground Limited, as extensive ground movements would be unacceptable to them for operation of the tunnels.

In order to protect their assets London Underground Limited normally restrict all ground works taking place within 3m of their assets. With the scale of our development however moving to a 1m perimeter dramatically increased floor area by 1000m<sup>2</sup> and thus increasing the value of the project by £3,750,000.



By using a powerful 2D Finite Element analysis to estimate the ground movements, we were able to convince London Underground Limited that we would provide adequate asset protection and consequently won approval for construction of a secant pile wall 1m from the London Underground Limited tunnel. This approval was given on the basis that an extensive monitoring regime would be carried out, which we also specified. Monitoring included total station monitoring of the London Underground tunnel, manual external monitoring of the secant pile wall and inclinometer monitoring of the secant pile wall. All movements were agreed with relevant parties and monitoring data was checked regularly to ensure the movements were not exceeded.

### 3. Conclusions

The basement construction of this building has been completed successfully and demonstrates that for the future of design we must not be afraid to challenge and push the boundaries set by others.