UNIVERSITY OF CAMBRIDGE
Department of Engineering

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

An investigation into the factors behind the adoption of Topdown Construction

It is hypothesised that the key stakeholders within the project team may have different drivers that led to the selection of Topdown Construction as the construction methodology. This thesis examines if there is an engineering reason behind the choice. It investigates the drivers of the 3 key stakeholders in the decision and attempts to identify the key driver. This is done through a literature review, significant project examples and two detailed case studies with semi structured interviews with the key stakeholders of each project.

The literature review explains the various types of basement excavation and construction that are currently undertaken. It demonstrates that Topdown Construction is typically utilised in deeper excavations, greater than 15m and that the horizontal movement of the retaining wall is broadly similar regardless construction methodology. Early contractor involvement may help to refine the design and fully analyse and integrate the actual construction methodology. The observational method could allow minimisation of the structure being built but would be very difficult to realise with Topdown Construction.

Four significant examples are studied; the Jubilee Line Station at Westminster, Heron Tower, 168 Fenchurch Street and the Northern Ticket Hall at Kings Cross St Pancras. All significant examples of a Topdown methodology discussed are driven by programme requirements. Secondary concerns included the desire to limit ground movements, maximisation of the site, to allow removal of old foundations and for archaeological constraints.

One Hyde Park and the Francis Crick Institute are examined as detailed case studies, with the construction methodology explained for each supported by semi structured interviews with the key stakeholders (the client, the consultant and the contractor). The case studies show that the key stakeholders were aligned and there was not a divergence in opinion with respect to the key driver, programme concerns. After programme the client was concerned quality, reputation, brand and risk. The contractor was concerned about logistics, buildability, safety and follow on works. The consultant was concerned with producing an efficient design that safeguarded the surrounding structures and services, and the integration of the permanent and temporary works design. The secondary drivers were very different and reflected the areas of risk that each stakeholder was responsible for.

Several other notable findings were highlighted. Topdown Construction squeezes the programme and puts additional pressure onto the project in multiple places. It significantly increases the intensity of construction and increases risk that the contractor is exposed to. The contraction of the programme results in Topdown Construction putting additional pressure on the design team. It requires structural design to be fixed earlier and building services design to be significantly more

developed. With the greater risk profile for the contractor and the early fixity of design, Early contractor involvement in Topdown Construction is advisable. Through the literature review and the significant examples it was noticed that the views of all stakeholders were not necessarily captured..

Ross Lankshear
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