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NIDO, Middlesex Street. London



**BYRNE
BROS**

A CHAMPION IN CONCRETE FRAME CONSTRUCTION





(Photos: Byrne Bros.)

Figures 1–3 above from left to right: The rate of rise for the central core at the Nido Student Accommodation project was 1.4–1.5m per day.

Nido project, 100 Middlesex Street, London



Using slipform techniques has enabled the construction of a 34-storey central core at the Nido Student Accommodation project, a mixed-use development on the edge of the City of London, to be achieved more than two months ahead of schedule.

ARAN VERLING, BYRNE BROTHERS

“Byrne has increasingly used slipform techniques on other projects but has refined methods so that speed and quality improvements can be significant.”

The project demonstrates what design for manufacture and assembly and a component-based approach can do for improving on-site productivity and how the team has coupled this with innovation that maximises the use of technology and off-site manufacture, to deliver a high-quality project.

Nido rises more than 100m above the northern fringes of the city near Spitalfield. The scheme comprises three elements: a 34-storey central tower; office space over six floors around an external courtyard; and a five-storey eastern wing built around a central atrium. With the exception of the steel frame for the office element, it is a concrete frame building.

Byrne Brothers was awarded a £24 million concrete frame contract by ISG in October 2007, having been involved in a series of workshops chaired by ISG to redefine the scope of the works and use of a homogeneous concrete solution. Its construction strategy centred on splitting the building into systems and subsystems, including bespoke solutions for slipform to the main core and adopting four key subsystems for the floor plates: rollmat reinforcement, Titan HV formwork, a formwork hoist and precast concrete columns.

At the pre-contract stage, ISG, Byrne and engineer Waterman carefully analysed the concrete structure.

Byrne’s team proposed adopting slipform construction techniques for the central core and, to minimise use of limited hook time, combined Titan HV formwork with an external mobile formwork hoist.

The programme focused on rapidly advancing the works to release the cores and podium slab for reinforced concrete works to the tower block, which was on the critical path. This was achieved by using slipform – a fast method for constructing vertical concrete structures – using Byrne’s in-house slipform rig based on similar systems that are used extensively in North America.

Byrne has increasingly used slipform techniques on other projects but has refined methods so that speed and quality improvements can be significant. The rate of rise for the central core at Nido was 1.4–1.5m per day despite the constraints of the site hours, typically a six-hour window of operations.

The slipform rig works with legs each side of the wall and two horizontal channels, which provide the jack support. This assembly holds the face of the walls together and carries the load from the working and trailing platforms.

The rig’s movement was not noticeable to personnel on the platform during the course of normal working. Hanging scaffolding off the working level on both the inside and outside platforms provides access for the removal of void formwork, concrete finishing and as-built surveys. The platforms are suspended by steel cables connected to the steel crossbeams that carry the decks.

The working and top deck are wrapped by a completely impermeable safety hoarding, while the hanging platform is enclosed with sheeting and is close boarded to fill all gaps against the cast concrete wall.

Slipform enabled Byrne to accommodate the requirements of the structure but a key element of slipform success is the skill of the operator where attention to detail, to keep the structure within tight tolerances, is vital.

Stretching 45m × 20m the slipform rig encircles the



core where each tower will house four lifts and service risers. Wall thickness varied from 400mm at the lower level to 225mm from floor 21 and above.

Work on the core started in March 2008 and stopped at floor 21 in June 2008 to allow the floor slab construction to catch up. Slipform work restarted in November and completed, at floor 34, in December 2008, taking the core construction off the critical path more than 20 weeks ahead of schedule.

Floor construction gathered pace as a result of using Titan HV formwork, rollmat reinforcement, precast columns and an innovative formwork hoist. Using Titan HV allowed the Byrne team to strike framing members on each slab much earlier in the curing process and leave the temporary supports in position. The panels and beams were then removed and reused on subsequent floors. In addition, rollmat reinforcement reduced preparation time per floor from two and a half days to one and a half days.

Each floor required 38 precast columns and if traditional in-situ techniques were used it would have tied up a significant amount of hook time. Concrete columns were precast at Byrne's preassembly facility in east London, called off in a predetermined sequence and installed on-site.

A result of the combined techniques meant slab construction time fell from an average of one floor every two weeks to an average of one floor every week.

Working closely with ISG to maintain the strict requirements on servicing the site, the logistics strategy embraces not only delivery issues but also the vertical transportation of people and materials on-site, which has proved essential for the Nido project. Working hours were limited to between 8am and 6pm each day. Byrne also developed a strict regime of controlling deliveries. Concrete deliveries came from Tarmac at King's Cross, four miles from the site. Local traffic can be extremely heavy in peak periods, therefore careful planning of concrete pours has been essential.

Approximately 20,000m³ of concrete will be poured over some 90 working weeks. The mean weekly total of 225m³ is misleading due to the intensity of activity between weeks 12 and 32, when the weekly demand ranged from 800m³ up to 1000m³. C80 was generally used in the precast columns and C60 for the slabs and core. The project is due for completion in 2010.



Figures 4 and 5: Work on the core started in March 2008 and completed, at floor 34, in December 2008.

Concluding remarks

Today slipforming offers a balance between maximising construction quality and reducing programme times. Techniques developed at Nido have created significant time-saving benefits as a result of effective partnership working between ISG, the main contractor, and Byrne Brothers, the specialist concrete frame contractor. This has been secured by concentrating effort into combining innovative thinking with new and existing technology. ■

Client/Developer:	Nido Student Accommodation
Main contractor:	ISG
Architect:	TP Bennett
Engineer:	Waterman
Concrete frame:	Byrne Brothers



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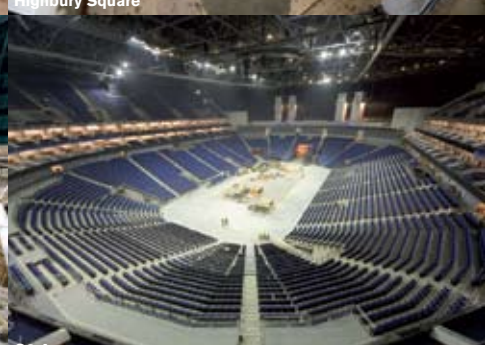
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