Case Study: Construction Logistics

Reducing and recycling concrete pour waste on a space constrained construction site

This case study describes the approaches taken to reducing concrete waste and managing site deliveries at a city centre construction location.

Key Facts

- Client: The Crown Estate.
- Development Manager: Stanhope Plc.
- Construction Manager: Sir Robert McApline.
- Concrete Contractor: Byrne Bros.
- 14,000m$^3$ of reinforced concrete poured.
- Dedicated on site logistics team.
- 67% of waste segregated into specific streams.
- 25% recycled aggregate and 40% cement replacement was utilised within the substructure.
- 98% of on site waste recycled.
- Use of delivery management software to ensure just-in-time material delivery schedule and to reduce concrete pour waste.
- Holding yard located a short distance from the construction site.

Overview

Located in Central London, Quadrant 3 is the focal point of The Crown Estate’s plans to create a new identity for Regent Street.

Sir Robert McAlpine Ltd was appointed as the construction manager to help oversee the efficient redevelopment of the former Regent Palace Hotel site.

Construction on the Quadrant 3 development commenced in October 2008 and is due for completion in December 2011. When complete, the development will comprise of 18,510m$^2$ of offices, 3,480m$^2$ of restaurants, 2,140m$^2$ of retail space, 11,260m$^2$ of back of house services and nine residential apartments.

From the project outset a logistics plan was created to assist the proactive management of material handling and deliveries required during construction. These procedures were communicated to all relevant parties and key stakeholders and a wide range of training was provided.

Sir Robert McAlpine’s use of the delivery management software DataScope ensures materials arrive just-in-time. Using this software, the site logistics manager maintains a close working relationship with trade contractors and suppliers and has the ability to approve or reject deliveries to the site as he sees fit. This allows the logistics manager to adjust deliveries if double booking occurs, increasing the delivery process efficiency.

Off site holding yard

As the site has limited storage at the entry point, the use of a holding yard located a short distance from the construction site allows vehicles to arrive early and delay their trip to the site until the prearranged time using a ‘Touch and Go’ system. This tool also gives the on site logistics manager greater control and flexibility in his operations by allowing vehicles to be held at the yard past their arranged delivery time should it be necessary.

All loads are delivered to the appropriate workplace on arrival through pre-defined material access routes to ensure that no blockages or obstacles are created within the construction site.
A dedicated on site logistics team receives deliveries and marshals them to their appropriate destination. The logistics team are also responsible for distributing materials, equipment and plant so that specialist operatives handle materials only when assembling or installing.

Reducing and recycling concrete waste

Poor delivery management can result in scheduled concrete deliveries needing to be changed. Preventing a build up of concrete mixers on site and therefore avoiding delay in the pouring process reduces:

- potential need to add water to maintain required workability;
- the risk of concrete not conforming to specifications and standards, thus being wasted; and
- production of CO₂ emission gasses from waiting concrete mixers.

Byrne Bros were appointed as the concrete contractor for the Quadrant 3 development, with recycling taking place at Ron Smith Recycling Ltd, based in Feltham, Middlesex.

The current industry standard of concrete waste recycling is approximately 75%, and in order to improve on this, Byrne Bros employed a number of logistics techniques.

Four concrete batching plants in Stepney, Battersea, Fulham and Kings Cross were utilised in conjunction with the Datascope delivery management system to control concrete deliveries entering the site.

Through a stringent Quality Assurance system, Byrne Bros were able to achieve concrete pours on a ‘right first time’ basis. Such stringent controls ensured that any errors in pouring were kept to an absolute minimum.

In addition, pre-cast concrete panels were used and installed by tower crane, helping to reduce the generation of waste on site. Using these techniques it was possible to minimise concrete waste on site.

Waste production and recycling targets

At the project outset, Quadrant 3 set two main waste targets for the substructure concrete trade contractor:

- minimum of 80% of total waste recycled; and
- generation of no more than 125 tonnes of waste per month.

Contractors were required to segregate waste into concrete, timber and metal streams. In total 67% of waste was segregated into these streams and combined with the efforts to reduce concrete waste, the site has seen 98% of waste being recycled. In addition, 25% recycled aggregate and 40% cement replacement was utilised within the substructure.

Over the three month trial period, Quadrant 3 generated an average of 104 tonnes of waste per month.

Keeping areas tidy and free from any build up of waste is key to achieving this fast-track project. A `reverse logistics` strategy is employed, whereby the return leg of delivery transport is utilised to take back unused material, waste or packaging on a daily basis.

Conclusions

Implementation of a comprehensive Material Logistics Plan has resulted in a number of economic, efficiency and sustainability benefits for the project. In particular, waste tonnage is lower than the target set and 98% of waste was recycled.