Case Study: Construction Logistics

Using a Construction Consolidation Centre to reduce deliveries and waste at One Hyde Park

This case study describes the primary benefits of using a Construction Consolidation Centre as a logistics solution at a constrained city centre construction site.

**Key Facts**
- **Client:** Project Grande Guernsey Limited.
- **Contractor:** Laing O’Rourke.
- **Consolidation Operations:** Select Plant Hire.
- **Use of an off site construction consolidation centre and online delivery management system.**
- **66% reduction in vehicle trips to the One Hyde Park development.**
- **Reduction in CO₂ emissions.**
- **93% of materials arrive at the Construction Consolidation Centre on time.**
- **100% of materials arrive at the construction site on time.**
- **100% of materials arrive in the right quantity and in the right condition.**
- **97% of on site waste recycled.**
- **Reverse logistics employed using the Construction Consolidation Centre.**

Centrally located in the heart of Knightsbridge, west of Central London, One Hyde Park (OHP) will be one of the most prestigious residential developments in the country utilising a Construction Consolidation Centre (CCC) for material deliveries to site.

Consisting of 86 apartments, spread over four pavilions overlooking Hyde Park and Knightsbridge, the OHP project commenced in July 2006 and is due to be completed in October 2010. Laing O’Rourke was appointed as the construction manager and has implemented logistics best practice to improve material handling, recycling and efficiency.

OHP lies within a severely space-constrained construction site which can lead to a number of issues including:
- severe traffic congestion on and off site;
- limited access points to site;
- limited capacity on site for storage of materials;
- restricted lay-down space on site for materials; and
- limited working hours for deliveries.

Each of these has a detrimental impact on transport, building, costs, waste management, the environment and the ability to deliver the project on time.

Traditionally, a notable proportion of direct deliveries to construction sites:
- are late, sometimes by several hours;
- are not booked in for delivery; and
- cannot be accommodated at the site immediately, resulting in a vehicle having to return later.

This results in materials arriving in the right place at the right time and in the right condition approximately 40% of the time (Transport for London 2008).
Efficient material delivery was identified as key to the successful implementation of the project programme and so the construction managers, Laing O’Rourke, engaged logistics specialists at an early project planning stage to formulate an integrated logistics plan.

It was decided to implement a CCC in order to provide the OHP project with secure off site storage, combined with all the efficiency benefits of consolidated and scheduled deliveries.

Located in Wembley, the CCC has 8000m$^2$ of internal and 3000m$^2$ of external storage space and provides short term secure storage for all materials used during the fit out phase of construction.

A penalty system, with a set fine per pallet, has been implemented for materials that are stored at the CCC for longer than 28 days, which ensures that materials are not left beyond the agreed timescale. All specialist trade contractors are required (as a condition in their contract) to support and implement the plan and make full use of the CCC.

Managing the CCC
Although run by Laing O’Rourke, operations at the CCC were the responsibility of Select Plant. Select Plant is part of the Laing O’Rourke group of companies and responsibilities include:

- managing delivery and safe storage of materials;
- ensuring materials received are in good condition;
- storing high value and easily damaged materials in a secure area;
- delivering all materials to site as called off by the trade contractor;
- ensuring trade contractors are satisfied with the condition of delivered material; and
- returning packaging and pallets to the CCC for storage until required for reuse or taken for recycling.
During a three month period a number of Key Performance Indicators (KPI) were used to measure the effectiveness of the CCC in meeting its intended objectives. Data collected to measure the performance during the trial included:

- Delivery vehicle mileage/emissions from inbound traffic (from suppliers to CCC);
- Delivery vehicle mileage/emissions from outbound traffic (from CCC to OHP site);
- On time delivery (into CCC);
- On time delivery (to OHP site);
- Weight of inbound material (into CCC);
- Weight of outbound material (to OHP site);
- No. of damaged goods created prior to arrival at the project site;
- No. of damaged goods created on site;
- Materials delivered that are out of specification (do not match the order);
- Weight of planned returns (maximising no. of return loads); and
- Weight of recyclable packaging returned to CCC.

These KPIs are described and evaluated in greater detail below.

**Reducing vehicle trips to the construction site**

The number of vehicles delivering to the OHP development was reduced by 66% as a result of the CCC. This reduction in trips has a positive impact on the highway network and has a number of other environmental benefits. In addition to this, the OHP development is located within the London Congestion Charge area and Low Emission Zone. By reducing the number of vehicles entering the development, significant cost savings are achieved.

Select Plant use an online delivery management system called Juggler, which schedules deliveries to and from the CCC. The success and effectiveness of such a system has resulted in 93% of deliveries arriving at the CCC on time and furthermore, 100% of deliveries arriving at the OHP development on time, ('on time' being defined as a delivery being made within 15 minutes of its allotted delivery slot). Operating in this way provides a just-in-time delivery system, smoothing the flow of materials and delivering usable quantities to trade contractors.

The improved delivery of materials reduces potential delay and replacement and therefore has a positive impact on the cost of delivering the project.

**Condition of materials**

Materials often arrive at a typical construction site damaged as a result of poor handling in transit or insufficient control at point of dispatch.

At the Wembley CCC, goods are inspected for damage before being accepted and this process is again repeated at the OHP development. During the trial period, no damage to material was recorded at either the CCC or at the OHP development and as a result no damaged goods were returned to the supplier.

**Materials specification and planned returns**

The use of a CCC has meant that no materials delivered to the site have been out of specification (i.e. materials that do not correspond to the original order made by the subcontractor). This is as a result of supplier deliveries arriving at the CCC being logged and stored in the subcontractors designated area of the facility so they can be matched to the subcontractors' daily requirements.

Regular scheduled vehicle journeys to and from site allow subcontractors to return any unused materials to the CCC rather than temporarily re-sorting and storing materials on site where space is already limited. This reduces the likelihood of both accidents and damage to materials. Furthermore, return journeys can also be used to remove recyclable waste from the site to the CCC, where it is batched and sold to a waste contractor. During the trial, 13.75 tonnes of recyclable waste was returned to the CCC in this manner.

Site housekeeping issues [quality, H&S, waste and dirt generation] are greatly improved by the arrival and on site storage of only those materials intended for immediate incorporation.
Waste management

As part of its attempts to implement best practice in construction, the OHP development committed to segregating waste into a number of recycling streams including plasterboard, inert materials, metals, timber, plastics and hazardous materials. The break down of the waste streams and comparisons with industry standard and best practice recovery rates is demonstrated in Table 1.

The table shows that the OHP development performed better than industry best practice in a number of waste streams.

Table 1 - Waste Segregation, Recycling Rates & Best Practice

<table>
<thead>
<tr>
<th>Material</th>
<th>Total Waste (kg) OHP</th>
<th>Recycled (kg) OHP</th>
<th>% Recycled OHP</th>
<th>Industry Standard Recovery % (for total waste recovery both on site and off site)</th>
<th>Best Practice Recovery % (for total waste recovery both on site and off site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasterboard</td>
<td>43,600</td>
<td>42,730</td>
<td>98</td>
<td>30</td>
<td>95</td>
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<tr>
<td>Inert</td>
<td>21,700</td>
<td>21,700</td>
<td>100</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>Metals</td>
<td>66,120</td>
<td>66,120</td>
<td>100</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Timber</td>
<td>93,300</td>
<td>90,500</td>
<td>97</td>
<td>57</td>
<td>95</td>
</tr>
<tr>
<td>Plastics</td>
<td>114,480</td>
<td>107,610</td>
<td>94</td>
<td>95</td>
<td>94</td>
</tr>
<tr>
<td>Total</td>
<td>339,200</td>
<td>328,660</td>
<td>98</td>
<td>70</td>
<td>97</td>
</tr>
</tbody>
</table>

Conclusions

Data from the OHP site demonstrates that CCC deliveries are made on time, efficiently, and make a significant impact on environmental performance.