PORT PAVING

Felixstowe South Reconfiguration

"Expansion through sustainable means" was Hutchison Ports (UK) Limited's ("HPUK"'s) philosophy behind the latest of the Port of Felixstowe's development the Felixstowe South Reconfiguration (FSR). The project involved the extensive re-engineering (and therefore maximisation) of existing and defunct operational areas within the port.

The first phase of the project comprised:

- The creation of a major new deep water terminal able to accept the latest generation of large container vessels
- The creation of 730m³ of new quay wall
- Infilling of the original Dock Basin and reclamation of a section of the River Orwell with circa 3 million cubic metres of fill
- Dredging to create the berthing pocket (16m below chart datum adjacent to the quay face initially but capable of being deepened to 18m) and on the main approach channel to 14.5m below chart datum.
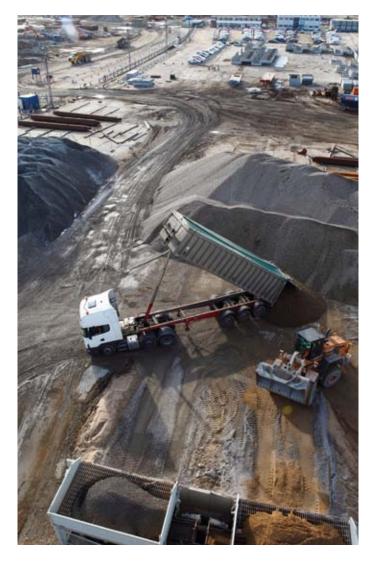
The new terminal will have a storage yard capacity of 20,000 TEU (Twenty foot Equivalent Units) over an area of 35 hectares in the first phase.

The pavement required a design load that could accommodate the location of 13 huge ship-to-shore gantry cranes, 50 rubber tyred gantry cranes and the large static loads imposed by stacked containers over a 20 year life period. As with many of the port's other developments the optimum solution was block paving laid over a cement bound material (CBM) base, which forms the back bone of the structure.

Bardon Composite Pavements (BCP) were employed by main contractor Costain Limited to provide the specialist sub contract work in paving 130,000m³ CBM. The cement bound base overlays the foundation and is designed at 375mm thick.

At site trial stage, BCP proposed the use of an alternative, 100% recycled aggregate to resolve a technical issue with the mechanical stability of a deep lift CBM. An Incinerator bottom ash aggregate (IBAA) was sourced and trialled. The material was used as a percentage replacement of the sea dredged sand and gravels. The use of IBAA provided improved mechanical stability, enabled speedier rolling and finishing of the CBM and provided a superior

surface finish. Utilising a secondary aggregate within the CBM also greatly improved the sustainability of the overall pavement. The CBM element of the pavement is fully recyclable at the end of its service life.

The CBM was mixed on site using a high output continuous mixing plant, transported to the paver in 30tonne dump trucks and placed using a heavy duty tracked paver with a dual, high compaction screed. The current generation of continuous mixing plants in the company's fleet feature internet linked computer controlled weighing systems. Utilising a site based mixing plant minimises the vehicle miles of the CBM delivery vehicles and therefore reduced CO_2 emissions. The use of 30tonne dump trucks to deliver the CBM to the paver not only increases productivity but also reduces the overall vehicle miles in delivering 130,000m³ CBM. Control over the quality of the product is also increased by the close proximity of the site mixing plant and paver. BCP has a BS EN ISO: 9001:2008 quality registration with British Standards covering both its mixing and paving operations. Average productions of 750m³ per day are currently being achieved which has peaked at 950m³ in a single day.

The CBM is placed in two discreet lifts of 200mm and 175mm. Both lifts are paved, rolled and cured within the specified construction period forming a monolithic slab. This method of paving, developed by BCP, offers a number of advantages. The ability to pave the CBM layer in one layer massively speeds up the pavement progress, as instead of waiting seven days to place the next layer of CBM, after the seven day curing period, the CBM is ready to receive the block paving.

Felixstowe is already the UK's busiest container port, handling over 3 million TEUs each year, however, following these latest improvements handling capacity will be sustainably increased by 50%. Phase 1 of the project is due to be completed in 2011 with the construction programme currently running on time.