

## Slabstress

Royal Liverpool University Hospital



**FREYSSINET**  
SUSTAINABLE TECHNOLOGY

### Client

Royal Liverpool and Broadgreen  
University Hospitals NHS Trust

### Engineer (Structures)

TPS

### Lead Architect

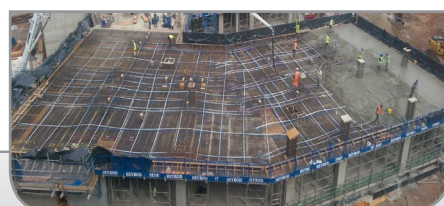
NBBT

### Contractor

Carillion

### Frame Contractor

Heyrod Construction



Work on the new Royal Liverpool University Hospital started in 2014. The £429 million project will see the new hospital constructed adjacent to an existing hospital building, which will be demolished once facilities have been transferred in 2017. The hospital will be the largest single-bed hospital in the UK, with 646 beds including a 40-bed critical care unit, 18 state of the art operating theatres, 23 wards and units and a large clinical research facility, the Liverpool BioCampus, which will be built on the site of the old hospital building as a key part of the city's Knowledge Quarter.

Freyssinet was awarded the contract for the design, supply and installation of post-tensioning to approximately 90,000m<sup>2</sup> of the new building.

The design of the building has been dictated by the needs of the different clinical areas, which form the lower four levels, and the eight floors of ward area which sit above. The aspect of the building has created a desire for distinctive 9m cantilevers at four locations on the façade.

Level 4 of the building has a massive transfer structure comprising of 1750 x 2750mm deep post-tensioned beams cantilevering the 9m. Away from the massive cantilevers, transfer beams drop to 1800 x 2100 deep, 2000 deep and 1500 deep PT beams to suit the loading. Between these, main beams run a network of 1250 x 1250mm RC transfer beams which pick up the ward column grid and transfer it to the clinical grid below.

The clinical slabs are 350mm thick and span 8.6 x 7.7m and ward slabs are 300 or 400mm thick depending on loading, on a grid of 8.0 x 7.6m. Recesses of 40-75mm depth are formed in the top surface of the structural slab.

The post-tensioning system designed by Freyssinet is a 4B15 bonded flat duct system in the slabs, with 19C15 multi-strand tendons used in the transfer beams. The latter will be stressed in stages to control deflections as more superstructure floors are added. Total PT slab area is 80,750m<sup>2</sup>.

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