

## PROJECT BRIEF

## Strengthening of Beams, Columns and Slabs at a Multi-Storey Car Park with the TYFO® Fibrwrap® Composite System



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An upgrading exercise at a public housing estate in Singapore required that a 3-level car-park structure be retrofit due to the conversion of the roof deck into a multi-purpose recreational area. The addition of planter boxes, a children's playground, a basketball court, 50 mm-thick concrete paving, and enclosed pavilions contributed to an increase in loads. This increase of dead and live loads on the roof deck precipitated the need for enhancing the capacity of the reinforced concrete beams, slabs and columns of the twenty-year-old structure. A design proposal was put forward to the local housing authorities for structural retrofit using the TYFO® Fibrwrap® Composite System.



Prior to acceptance of the proposal, a study was initiated in collaboration with the Centre for Construction Materials & Technology at the National University of Singapore, to investigate the effects of strengthening existing reinforced concrete beam, slab and column elements with composites. Beam, slab and column elements from the existing car-park were extracted from portions of the structure to be demolished due to upgrading, and wrapped with the TYFO® Fibrwrap® Composite System under various configurations. The strengthened and control specimens were then tested to failure. The test results on the extracted specimens showed substantial load-carrying enhancements for the beams, slabs and column elements strengthened with the patented TYFO® Fibrwrap® Composite Systems.

Upon successful completion of the test program, the proposal to upgrade the multi-storey car park with the TYFO® Fibrwrap® Composite System was approved. The retrofit works to the structure were carried efficiently with minimal disruption to the car park and residents in the area.

**FYFE Asia Pte Ltd**

8 Boon Lay Way, #10-03 Tradehub 21, Singapore 609964

**Tel:** +65 6898 5248 • **Fax:** +65 6898 5181 • **E-mail:** info@fyfeasia.com • **Web:** www.fyfeasia.com