

Allhallows MSCP is reborn following its £2.35m transformation.



Innovative remedial solutions used on a multi-million pound refurbishment of an ageing car park in Bedford culminated in the coveted 'Best Refurbishment Award 2015' at the British Parking Awards. Graeme Middleton of Makers Construction tells the story.

The Allhallows MSCP in Bedford town centre was typical of a crumbling 1960s reinforced concrete structure that, having been designed and built in accordance with the prevailing standards of its day, was exhibiting all the signs of concrete distress for a multi-storey car park exposed to the rigours of daily parking life since its original construction in 1960.

This in-situ, flat slab reinforced concrete structure is made up of seven split-level decks supported throughout with circular in-situ columns and inclined circulatory

Poorly lit and unprotected from the effects of carbonation and salt-water ingress.



Allhallows in early 2013 before works commenced.

ramps connecting all decks. It was constructed in two phases: the 'East' was the first to be built in 1960, which included the main stairwell core, followed by the 'West' in 1962. Both structures are separated by a 25mm movement joint.

The structure

The structure – built over the top of retail premises – is approximately 94m long x 32m wide with the main access stairs and lifts at the front of the car park facing on to the (now) new Bedford bus station. Access stairwells are located at the two rear corners of the building with reinforced concrete external vehicular access ramps located at the side of the structure.

With Allhallows MSCP situated in the heart of Bedford and adjacent to the town's somewhat run down and outdated bus station, it was highlighted as needing to undergo a complete transformation as part of the town's long-standing plan for the Bedford Gateway project, which would see a new bus station and transport hub regenerating this strategically important area of Bedford.

Though initially earmarked for demolition and redevelopment, the car park underwent detailed



Extensive damage to daywork joints reveals significant loss of steel section.

intrusive surveys in 2010, which highlighted specific concerns over the volume of deterioration around the daywork joints and, in particular, within the older parts of the structure where the damage was much worse.

The damage was occurring to both the top and bottom reinforcement at the daywork joints with significant loss of section, where in some cases there was 100% loss. Electromagnetic anomaly detection (EMAD) technology was also used to identify anomalies, ie, where breaks in the continuity of steel were, enabling defects to be identified and mapped rather than having to embark on the laborious – and consequently expensive – process of destructive investigation to identify the extent of these defects.

Structural concerns

Further investigations highlighted structural concerns over the volume of concrete degradation and steel corrosion around the bases of the columns and to the top steels located in the decks around those areas.

Testing and analysis of the concrete’s condition throughout confirmed that chloride-ion content was at the upper end of the ‘medium’ risk category (as per BRE IP 21/86⁽¹⁾), which rang true given the complete lack of protection of the structure’s parking decks since its construction.

The identified repair areas were marked up and saw cut around the perimeters to ensure square-cut edges to the proposed repair sites. Defective concrete was removed by hydro-demolition techniques to expose the corroding reinforcement, while at the same time removing corrosion product from the reinforcing steel. Drainage areas were netted over to prevent them from becoming clogged with the concrete spoil being cut out.

‘Lost’ steel – particularly in the daywork joints – was replaced with new. Part of the remedial structural solution was also to cut 1200mm-long × 50mm-deep chases perpendicular to the daywork joints at 300mm centres into which 1000mm-long × 12mm-diameter reinforcing bars were grouted and ‘weighed down’ while curing to prevent the vertical expansion of the grout and possible displacement of the new steel. General repairs to the concrete decks were carried out using a pre-bagged and pourable cementitious repair mortar.

Shutter finish

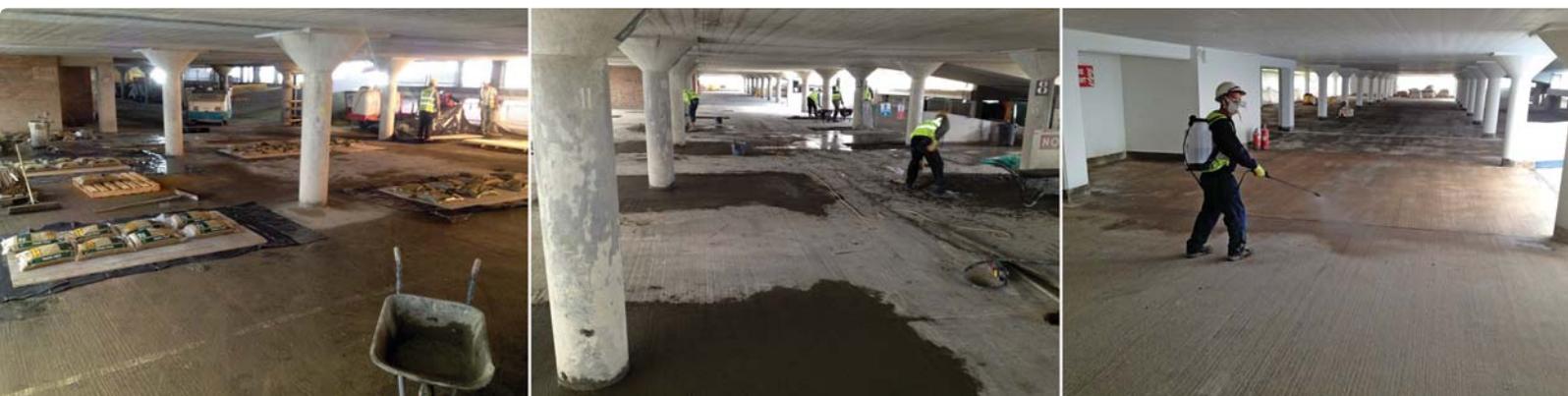
With an existing ‘shutter finish’ to the soffits of the car park, which had to be retained as a design feature, timber rails were fixed to either side of the soffit joints to enable them to be neatly cut out before preparation and reinstatement using a spray-applied, pre-bagged cementitious repair mortar.

Once sprayed, the excess overspray was trowelled off and following initial set, the board finish was recreated by hand to disguise and blend in the repairs. Not only did this mean that the repairs were ‘aesthetically neutral’ (ie, you can’t see them), it also gave a significant time- and cost-saving benefit for the repairs required.

Following all concrete repairs and thorough surface preparation through captive blasting, a migratory corrosion inhibitor was spray applied to the parking decks throughout as part of the corrosion management system, ensuring long-term success of the concrete repair strategy.

A fully waterproof and crack-bridging car park deck-protection system was applied to all decks throughout in contrasting colours (dark grey to drive aisles, parking bays in blue with added pedestrian walkways for safety).

Major repairs at joints and column bases followed by the application of a migratory corrosion inhibitor.





Significant soffit damage at daywork joints.



Above: Soffit repairs spray-applied and blended in.

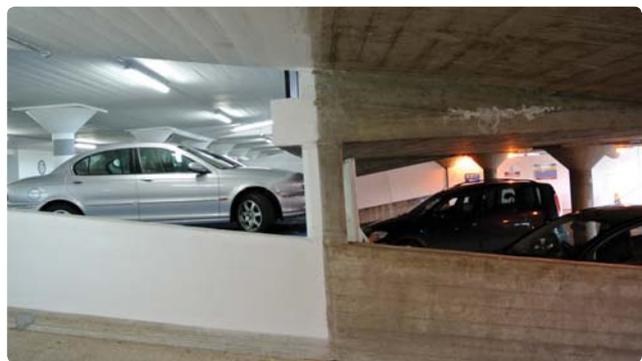
Right: Allhallows' internal transformation in progress.

All non-trafficked concrete soffits, columns, beams and walls were protected with white anti-carbonation coatings to enhance the lux levels and maximise light reflectance for the new energy-efficient passive infrared sensor (PIR) inducted lighting system that was installed as part of the contract.

A new and specifically designated disabled users' parking area was created on the first floor Level 1, with its own specially designed lift that would allow customers easier access between the first floor and street level. The original disabled parking areas were inconveniently located on Levels 2 and 4.

To finish off the project, the top deck was also given over to a 48MW solar electricity generating station to offset the costs of lighting the car park by providing its own power.

The car park was kept open to customers during its 52-week long transformation, which was completed in April 2014. ●



Reference

1. BUILDING RESEARCH ESTABLISHMENT, Information Paper 21/86. *Determination of the chloride and cement contents of hardened concrete.* BRE, Bracknell, 1986.

The dark, drab interior is given a new lease of life.

