RESTEK

BARCLAYCARD MULTI STOREY CAR PARK

Client:
ISS TECHNICAL SERVICES

The Problem

We were approached by our client to carry out a structural survey on the condition of their deteriorating Multi-Storey Car Park (MSCP). The external and exposed elevations were found visually to have deteriorated and exhibited distress in some areas with exposed surfaces found to be weathered and discoloured, generally consistent with concrete elements cast and exposed in this environment where no form of protection from the elements or salts had been factored in.

The ground bearing slab and columns were also displaying a considerable level of distress where the fracture crack width characteristics highlighted the need for a greater number of expansion joints and settlement predominantly to the ground bearing slab.

Carbonation Reaching Rebar

Our survey found various signs that the concrete MSCP had been suffering from the effects of carbonation contamination that had extended well beyond the reinforcement and subsequently caused spalling and delamination of the concrete as a result of the expansive forces corroding steel experiences once carbonation reaches the reinforcing steel.

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The Solution

The carpark was in generally poor visual condition with 459 defects identified that required a number of specialist applications ranging from *structural resin injection, carbon fibre plate bonding, waterproof deck coatings* and the installation of *Emseal DSM Joint System* to mention but a few. An appropriate specification for the repair and refurbishment of the concrete that would limit disruption to our clients operations had also been adopted. We opted for a conventional concrete patch-repair and coatings specification using migrating corrosion inhibitors (MCIs) that would provide an extended insurance backed warranty of 15 years by slowing down the rate of carbonation and extending the life cycles of the building components.

Added benefits with this method of structural strengthening

Carbon Fibre:

Carbon fibre reinforced polymer (CFRP) laminate designed for strengthening concrete, timber and masonry structures. The carbon fibre was bonded onto the structure ramps using an epoxy resin as the adhesive. The application of the carbon fibre was recommended to reduce the stress in the reinforcing steel as well as decreasing deformation due to the loss of section on the steel reinforcement.

Advantages

- Very high strength
- Lightweight
- Non-corrosive
- Unlimited lengths
- Minimal preparation of laminates
- Very easy to install, especially overhead
- High modulus of elasticity
- Outstanding fatigue resistance
- Alkali resistant
- Simple laminate intersections or crossings
- Increased live loads in warehouses
- Increased traffic volumes on bridges.

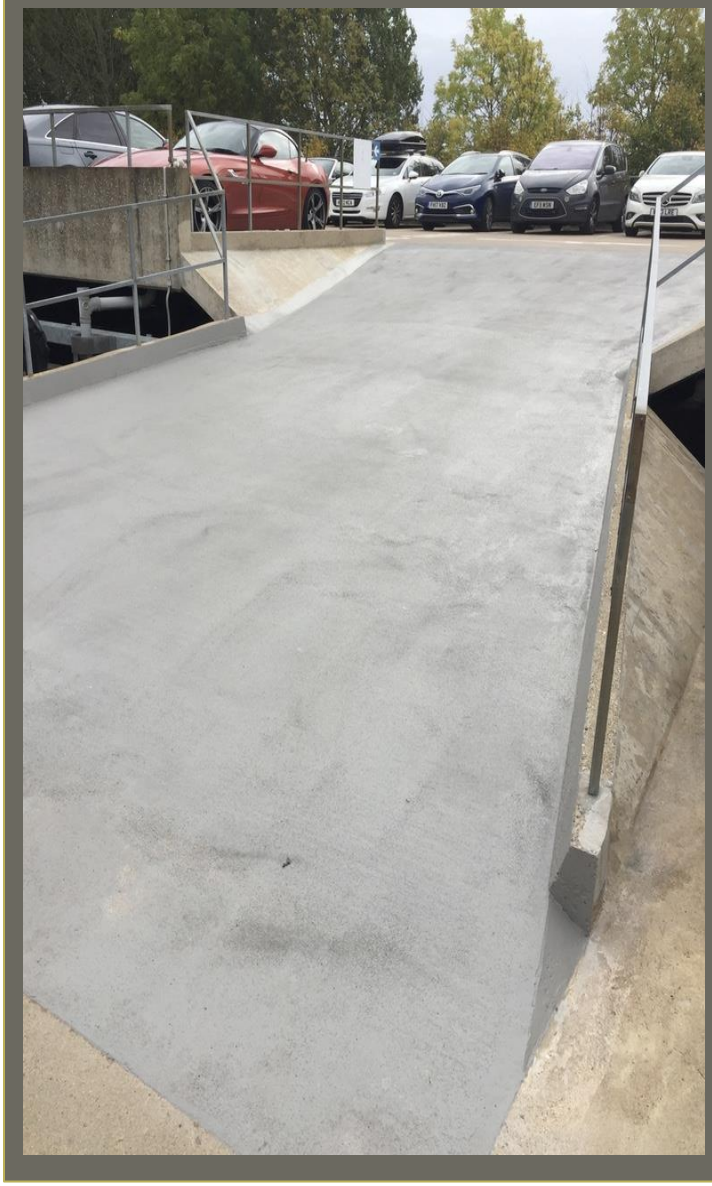
Delaminated column top thickening overhead requiring *Structural Resin Bonding* using our pressure injection system. Preventing the concrete thickening from spalling and to seal the head from water ingress through the top deck column lift slab.

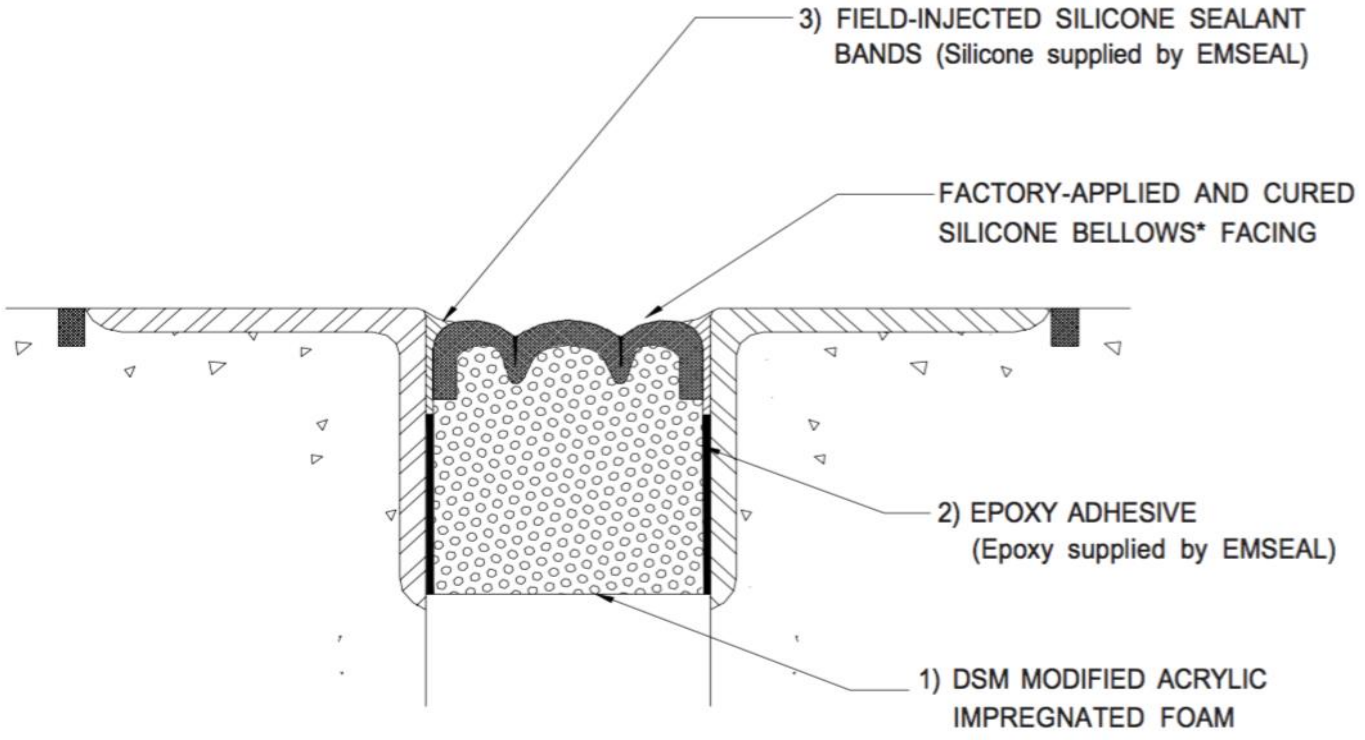
Deck Coatings

Deck Floor systems are designed to waterproof and surface external car park decks and ramps over parking, internal car park decks and ramps over parking/occupied premises, and ground bearing decks and ramps.

We applied and even coat by roller then immediately embed the reinforcement fleece into the wet resin before applying another coating to finish.

The heavy-duty systems incorporate a BBA and ETA certified reinforced waterproofing membrane for high risk areas and details in combination with an exceptionally durable, flexible, waterproof wearing layer.





DSM JOINT DETAIL

Watertight Joint System for Decks

The DSM SYSTEM used at BC featured an innovation in sealant technology in the form of an acrylic adhesive infused into the cellular foam base material. This new chemistry incorporates a hydrophobic micro-cell component never before available in a sealant formulation.

The material features sealing performance significantly greater than any acrylic impregnated predecessor. Capable, as a dual seal, of movements of +30%, -25% (55% total) of nominal material size. DSM will remain watertight up through movements of +50%, -25% (75% total) of nominal material size with the silicone bellows providing the waterproofing.